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OF

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# ERRATA

## VOLUME XXV

page 127 line 49 for 'v' read 'vi'
167 21 for '86–87' read '85–118'
327 17 for 'first' read 'second'
22 for 'second' read 'first'
397 43 delete '[*Ramulispora*]'
582 47 for 'xvi' read 'xviii'

## VOLUME XXVI

7 45 for 'Saville' read 'Savile'
13 3 for 'bisdithrocarbamate' read 'bisdithiocarbamate'
20 6 for 'fruits' read 'material'
36 23 insert ',' after 'Bordeaux'
41 44 for 'broad bean [*Vicia faba*]' read 'bean [*Phaseolus vulgaris*]'
46 for '*fabae*' read '*appendiculatus*'
42 11 for '*Friscanua*' read '*Friscanus*'
85 46 transpose '15th February' and '1st December'
103 48 for '*Jatropha* [*curcas*' read 'jack [*Artocarpus integer*'
107 6 for 'arasan' read 'ceresan'
117 25–26 for '*jnaczewskii*' read '*janczewskii*'
134 22 transpose 'varieties' and 'its'
143 50–51 for '(Mont.) Fr.' read '(Fr.) Mont.'
144 52–53 delete '[? *spicifera*: cf. ibid., xix, p. 258]'
147 17 for 'H. A. Eddins' read 'A. H. Eddins'
49 for '*D.*' read '*Diaporthe*'
175 19 for 'McColloch (L.)' read 'McColloch (L. P.)'
205 41–42 for 'xxv, p. 127' read 'xxvi, p. 114'
255 1 for 'equal weights of chloral hydrate and' read 'two parts, by weight, of chloral hydrate and one of'
278 41–42 for '*Eusceles maculipensis*' read '*Euscelis maculipennis*'
317 14 for '*albus*' read '*alba*'
331 1 for '*foetens*' read '*foetida*'
335 15 for '*Rhagdolobium*' read '*Rhagadolobium*'
344 6 for 'xxiv' read 'xxiii'
442 42 insert 'De' before 'Ropp'
492 43 delete '[*Ramulispora*]'
506 46 for 'Haigh (J. G.)' read 'Haigh (J. C.)'
514 9 for '*Forh. Videnskˆ Selsk. Krist.*' read '*K. norske videnskˆ Selsk. Forh.*'
553 35 for 'Horsfall (J. O.)' read 'Horsfall (J. G.)'

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IMPERIAL MYCOLOGICAL INSTITUTE

# REVIEW
OF
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VOL. XXVI JANUARY 1947

WALKER (J. C.), SCHROEDER (W. T.), & KUNTZ (J. E.). **Borax sprayed on Beets controls black spot.**—Reprinted from *Bett. Crops, 1944*, 4 pp., 3 figs., 1944. [Received September, 1946.]

In 1942, most of the fields planted with garden beets in eastern Racine and Kenosha counties, south-eastern Wisconsin, showed varying amounts of black spot [*R.A.M.*, xxv, pp. 380, 430] although borax had been applied at a rate of 50 lb. or more per acre before sowing. It is during or after the usual local mid-season droughts that boron deficiency becomes acute. In trials of mid-season spraying (in addition to the spring treatment) the unsprayed controls in the first experimental field, planted with Asgrow Canner, showed 37 to 43 per cent. black spot with 14 to 23 per cent. severe. Those given sprays containing 10 and 20 lb. borax per acre on 8th July and 7th August showed 6 per cent. or less severely affected plants. A single treatment of 20 lb. per acre on 7th August had no appreciable effect. In the second field, planted with Detroit Dark Red, where the percentage of affected plants was much lower in the unsprayed plots, a single application of 20 lb. per acre on the first date was highly effective, reducing the percentage of severely affected plants to under 0·4.

These results demonstrate that while a heavy spring application of borax is not a guarantee against heavy losses from black spot, a supplementary mid-season spray when applied at the proper time can reduce the condition to negligible proportions. It is hoped to carry out further work later.

WALKER (J. C.) & HARE (W. W.). **Pea diseases in Wisconsin in 1942.**—*Res. Bull. Wis. agric. Exp. Sta.* 145, 32 pp., 9 figs., 6 graphs, 1 map, 1942. [Received September, 1946.]

In this survey during 1942 of pea diseases in Wisconsin, the leading State in the production of canning peas, over 40 per cent. of all fields examined showed infection from *Ascochyta* blight (*Mycosphaerella pinodes*, *A. pinodella*, and *A. pisi*) [*R.A.M.*, xxi, p. 438; xxii, p. 285], bacterial blight (*Bacterium pisi*) [ibid., vii, p. 214], and common root rot (*Aphanomyces euteiches*) [ibid., xxi, p. 60]; 25 per cent. from anthracnose (*Colletotrichum pisi*) [ibid., i, p. 282], *Septoria* blotch (*S. pisi*) [ibid., xxi, p. 238], downy mildew (*Peronospora viciae*) [ibid., xiv, p. 340], and mosaic and streak virus [ibid., xvii, p. 220; xx, p. 334] diseases; and 10 per cent. from near wilt (*Fusarium oxysporum* f. *pisi* race 2) [ibid., xix, p. 252]. Powdery mildew (*Erysiphe polygoni*) [ibid., xxv, p. 225], *Fusarium* root rot (*F. solani* f. *pisi*), *Rhizoctonia* root rot (*Corticium vagum*) [*C. solani*: ibid., iii, p. 439], and frost injury were of little consequence. *F. oxysporum* f. *pisi* race 1 was not recorded, its absence being attributed to the planting of wilt-resistant varieties. In experimental plots, however, where wilt-susceptible varieties were planted, they were practically eliminated by the parasite.

The over all loss in Wisconsin for 1942 in respect of root rot alone is roughly assessed at 10 per cent. but is probably higher if losses from secondary root infection in abandoned flooded fields are included. The combined effect of other major diseases may be estimated at another 10 per cent. A further loss, intangible but

almost equally important, is due to the inferior quality associated with severe disease incidence.

The alarming general increase in *Ascochyta* blight, anthracnose, bacterial blight, and mosaic and streak virus infections cannot be explained entirely as due to the cool, wet season. The survey showed the first three to have been widely disseminated through western-grown seed. Maximum efforts should be made by seed-growers to control seed-borne pathogens and the establishment of a pea certification system may be required. Rotational cropping is urged and the fact that 20 per cent. of the 1942 pea crop was grown on land cropped with peas the previous year is regarded as one of the contributory causes of increased disease. Finally, the importance of the selection of well-drained fields is emphasized as a means of minimizing damage from root rot.

Walker (J. C.) & Snyder (W. C.). **Pea wilts and root rots.**—*Bull. Wis. agric. Exp. Sta.* 424, 16 pp., 3 figs., 2 graphs, 1942.

In this revised edition of a bulletin first published in 1933 [*R.A.M.*, xii, p. 609] a list of varieties resistant to all strains of wilt (*Fusarium oxysporum* f. *pisi* race 1) [ibid., xxv, p. 247] is given. The varieties Horal and Roger's K are cited as offering some resistance to near wilt (*F. oxysporum* f. *pisi* race 2) [ibid., xxiv, p. 486 and preceding abstract]. A section is included on the relation between soil type and wilt and the spread of the organism in the soil.

**Plant diseases. Certification of French Bean seed.**—*Agric. Gaz. N.S.W.*, lvii, 8, pp. 420–422, 4 figs., 1946.

The French Bean Seed Certification Scheme introduced in New South Wales in 1943–4 [*R.A.M.*, xxiv, p. 172; xxv, p. 22] was continued in 1945–6, when some 1,200 acres were inspected and 222 acres passed for certification. Several hundred bushels of certified Brown Beauty and Hawkesbury Wonder seed should be available for growers.

Yu (T. F.). **Powdery mildew of Broad Bean caused by Erysiphe polygoni DC. in Yunnan, China.**—*Phytopathology*, xxxvi, 5, pp. 370–378, 1946.

Powdery mildew of broad bean (*Erysiphe polygoni*) is very prevalent in the south of Yunnan, where it attacks the leaves, petioles, stems, and pods, occasionally causing a certain amount of damage, though the disease is in general of no great economic importance. The relatively high air temperatures prevailing from March to May, when the monthly means reach or exceed 20° C., favour outbreaks of the mildew.

Contrary to the results obtained by other workers [*R.A.M.*, v, p. 5; xv, p. 659], the writer succeeded in the inoculation of peas with the broad bean mildew and vice versa, and accordingly concludes that in Yunnan both diseases are caused by the same physiologic race of the fungus, which he designates *E. polygoni* DC. f. *viciae pisi* n. f., differing from Hammarlund's f. sp. *viciae-sativae* [ibid., iv, p. 431] in its capacity to infect peas. A distinct race of the mildew occurs on *Lathyrus quinquenervius*.

*E. polygoni* f. *viciae pisi* may overwinter either in the conidial or perithecial stage on broad beans, peas, and wild species of *Vicia*, e.g., common vetch and *V. hirsuta*.

Croxall (H. E.). **Some factors influencing loss of Onion bulbs during storage.**—*Rep. agric. hort. Res. Sta. Bristol, 1945*, pp. 143–147, [?1946].

In experiments undertaken during the 1944 season, early lifting of onions before the tops had died (after which *Botrytis* infection is most likely) [*R.A.M.*, xxiv, p. 261; xxv, pp. 91, 199] resulted in markedly less loss in storage of bulbs of the varieties Bedfordshire Champion, Danver's Yellow Globe, Giant Zittau, Red

Wethersfield, Rousham Park Hero, and Up-to-Date, thus bearing out the previous findings. Bulb loss was much higher in Danver's Yellow Globe than in the others. Onions stored outside deteriorated more quickly after 12th February than those stored in a greenhouse. No effect on subsequent loss in storage accrued from dust-treatments with sulphur, 50 per cent. tetramethylthiuram-disulphide, and a proprietary compound containing trichlornitrobenzene.

Most of the storage loss was due to *Botrytis allii* and the major part of the remainder to *B. cinerea*.

Ogilvie (L.). **Downy mildew of Lettuce: further investigations on strains of Bremia lactucae occurring in England.**—*Rep. agric. hort. Res. Sta. Bristol, 1945*, pp. 147–150, 2 figs., [?1946].

Continuing his studies on downy mildew of lettuce (*Bremia lactucae*) [*R.A.M.*, xxiii, p. 470], the author describes further investigations of the two strains, now designated 1 and 2, collected from over 20 localities.

Strain 1, the specialized strain of *B. lactucae*, was isolated principally from outdoor lettuces. Seedlings of prickly lettuce (*Lactuca serriola*) proved susceptible to infection by sprayed spores but *L. virosa*, *L. muralis*, endive (Batavian and curled), chicory, groundsel (*Senecio vulgaris*), and sow-thistle (*Sonchus oleraceus*) were not infected. The following additional lettuce varieties are listed as susceptible to strain 1: Arctic King, Attractie, Blatchford's Giant, White Cos, Borough Wonder, Cheshunt Early Giant, Feltham King, Forcing Mildew Resistant (Watkins and Simpson), Webb's Wonderful, and Celtuce, while Finney's 27 and Grand Rapids are added to the resistant varieties.

Strain 2 was found mainly on indoor lettuces and was shown experimentally not to infect endive, chicory, groundsel, sow-thistle, or *L. muralis*, but *L. serriola* and *L. virosa* proved easily susceptible. All cultivated varieties tested so far have proved susceptible and no variety resistant to this strain is yet known in Great Britain.

The author reviews previous work [ibid., xii, p. 417; xix, p. 577] on strains of *B. lactucae*, including that of Erwin (*Bull. Ia agric. Exp. Sta.* 196, 1921), whose *B. lactucae* strain, found on *L. scariola* var. *integrata* ( = *L. virosa*) and transmitted to three wild American species and 27 cultivated varieties, was apparently similar to strain 2 discussed here. *L. serriola* and *L. virosa*, with their ability to act as hosts of *B. lactucae*, are described as a menace in the vicinity of market-gardens. While strain 1 has been found only on the former, strain 2 attacks both *L. serriola* and *L. virosa* which, as biennial weeds, can carry the fungus over from one year to the next. A large colony of *L. serriola* severely infected with strain 1 of *B. lactucae* was discovered on the banks of the Avon near Bath. Plants have also been found on a bombed site in that city, and along railway cuttings near Taunton.

*L. virosa*, susceptible to strain 2, is nearly related to *L. serriola*, similarly distributed, and cultivated in connexion with the production of the medicinal drug '*lactucarium*'. *B. lactucae* has not been found occurring naturally on this species.

In considering the breeding of resistant varieties, it is observed that lettuce, *L. serriola*, and *L. virosa* are all included in the *Lactuca* group having nine chromosomes, and cultivated lettuces probably owe their origin to *L. serriola*. The three species readily intercross and it is suggested that, as in the United States, they might be employed for the breeding of mildew-resistant varieties in this country.

Baker (K. F.). **Observations on some Botrytis diseases in California.**—*Plant Dis. Reptr*, xxx, 5, pp. 145–155, 1946. [Mimeographed.]

Three field epiphytotics of *Botrytis cinerea* in southern California were conditioned, respectively, by heavy rainfall in the winter of 1940–1 coupled with the normal mild temperatures of the State; unusually low temperature, high humidity, and many cloudy days from May to August in 1944; and infection prior to planting

out in April, 1945. All observations made support the conclusion that this parasite requires high humidity or free moisture in order to become aggressive, and is favoured by temperatures considerably below 70° F. The facultative parasitic nature of *B. cinerea* suggests that temperatures too low to favour the host, but not low enough to reduce fungal growth considerably, that is, not below 41°, are optimal for pathogenicity.

One of the epiphytotics occurred on greenhouse-grown *Capsicum* [chilli pepper] seedlings (California Wonder Bell) at Vista and San Juan Capistrano in 1945. The onset of the disease is attributed to the plants being packed, after hardening out of doors for some weeks, in layers in wet Canadian peat for transport to the fields. Uniform lesions were formed 3 to 5 in. from the top of the root system, notwithstanding that the plants remained in the crates only two to three days and were stored in a cool shed [*R.A.M.*, x, p. 57].

Borzini (G.). **Sulle crittogame più dannose alle nostre coltivazioni di funghi 'prataioli' (Psalliota campestris L. e Psalliota arvensis Sch.).** [On the fungi most injurious to our cultivation of edible Mushrooms (*Psalliota campestris* L. and *Psalliota arvensis* Sch.).]—*Boll. Staz. Pat. veg. Roma*, N.S., xxii, 3–4, pp. 131–172, 1 pl., 5 figs., 1942. [Received June, 1946.]

After giving an interesting account of the chief fungal and bacterial diseases attacking *Psalliota campestris* and *P. arvensis* in different countries and of the organisms that contaminate the beds, the author briefly describes the diseases that affect these hosts in Italy. Hitherto, failure has generally been due in Italy to attacks by *Mycogone perniciosa* [*R.A.M.*, xxii, p. 160], *Verticillium malthousei* [ibid., xxv, p. 93], and *Pseudomonas tolaasi* [ibid., xxiii, p. 126], and to the contaminating moulds *Verticilliopsis infestans* (*Oospora fimicola*) [ibid., xix, p. 191], *Papulaspora byssina* [ibid., xvii, p. 93], and the so-called green moulds (*Chaetomium olivaceum*, *C. globosum*, *Myceliophthora lutea*, and *Penicillium*, *Aspergillus*, and *Trichoderma* spp.) [cf. ibid., xiv, pp. 345, 346 *et passim*], but better methods of cultivation have now improved the situation.

Symptoms attributed formerly to *Mycogone perniciosa* have been constantly found associated in Italy with *Verticillium malthousei*. The characters of the fungus closely agreed with those described for *V. malthousei* by Ware [ibid., xiii, p. 287]; the simple conidiophores measured 10 to 150 by 0·8 to 2·5μ, the branched conidiophores up to 750 by 1·5 to 3·5μ, and the conidia 2·5 to 14 by 1·5 to 3μ, while the spore masses were 5 to 18μ in diameter. Under Italian conditions, *V. malthousei* commonly occurs during the final stages of growth, but the damage caused is not serious and is reduced by improving the ventilation of the beds.

The commonest bacterium found is *Pseudomonas tolaasi*, but it occurs only when atmospheric humidity is excessive and ventilation inadequate. *O. fimicola* and *Papulaspora byssina* are present in almost every bed, but they form only isolated centres of infection and seldom affect production. Green moulds occur only occasionally, and no noteworthy attack by *Myceliophthora lutea* was observed. From time to time a species of *Apiotrichum* spreads in epidemic fashion when the mycelium is sown, but later infections are negligible. *Pleurotus mutilus* [ibid., xvi, p. 653] was observed occasionally.

The paper concludes with practical directions for the prevention of disease in mushroom beds.

Flanzy (M.), Raymond (M.), & Bouscary (Andrée). **Défense du vignoble contre l'Oïdium. Essais de 1944.** [Protection of vineyards against *Oidium*. Experiments in 1944.]—*Rev. Vitic., Paris*, xcii, 8, pp. 229–234; 9, pp. 262–267, 1946.

Since 1941, the losses caused in France by vine *Oidium* [*Uncinula necator*: see next abstract] have increased every year. In 1942 and 1943 the disease reduced the

harvest by one-tenth. In the department of Aude alone the losses averaged 3,000,000 hl. wine per annum, or half the average yield, while in the south of France as a whole the losses amount to at least 10,000,000 hl. wine per annum. If effective action is not promptly taken, the cultivation of the most susceptible varieties, such as Carignan, Muscat, and Chardonnay, will have to be discontinued.

Details are given of an experiment carried out in the vicinity of Narbonne in which powdered local sulphur ores, five commercial sulphur products, and sodium bisulphite were compared with pure sulphur in spraying and dusting tests [*R.A.M.*, xxv, p. 432].

The results obtained may be summarized briefly as follows. In a year which was remarkably hot and dry and in which mildew attack was heavy the spray products gave insufficient protection, though most of them were fungicidal to some extent. The Narbonne powdered ores, on the other hand, when containing a sufficient percentage of sulphur, proved themselves to be of high value. Even the raw powder, averaging only 10 per cent. pure sulphur, by itself gave satisfactory control. If sulphur is added up to 20 per cent., or veins are struck containing about 20 per cent. sulphur, the material will be as good as triturated sulphur. Control by means of pure sulphur can now be regarded as superseded.

In severe outbreaks, very effective control will be given by four applications of powdered ore enriched to 35 per cent. If only powdered ore with 20 per cent. sulphur is obtainable a supplementary application before or after flowering should be given. If only the crude powder is obtainable six treatments are necessary, four before flowering and two after. For mild infections, three applications should be given with powders containing 35 or 20 per cent. sulphur, or four with those containing 10 per cent.

In present circumstances, the important thing is to apply early and repeated treatments, to reduce the number of spray applications and increase the number of dustings, making the utmost use of the local powdered ores with a content of at least 10 per cent. pure sulphur.

Vidal (J. L.). **Efficacité comparée du soufre pur et des minerais enrichis, contre l'Oïdium.** [Comparative effectiveness of pure sulphur and enriched sulphur ores against *Oidium*.]—*Rev. Vitic., Paris*, xcii, 7, pp. 205–206, 1946.

After referring to the conflicting views that exist in France on the relative merits for use against vine *Oidium* [*Uncinula necator*: see preceding abstract] of pure sulphurs (i.e., sublimated and triturated containing 98 or 99 per cent. sulphur) on the one hand and ores enriched by the addition of pure sulphur on the other [*R.A.M.*, xxv, p. 433], the author describes an experiment carried out at Bois-Charente in 1945 on a plot of the highly susceptible Colombard variety which had been severely affected in 1944. The results showed that infection percentages after treatment with yellow sulphur, sulphur ores, and colloidal sulphurs, respectively, were 18·79, 21·01, and 36·97. Thus, in this test the effectiveness of the sulphur ores was quite comparable with that of the pure sulphur.

Roseau (H.). **Les méfaits de l'Oïdium en 1941 dans le vignoble du littoral cherchellois.** [The damage caused by *Oidium* in 1941 in the vineyard of the Cherchel littoral.]—*Rev. Vitic., Paris*, xcii, 7, pp. 201–202, 1946.

During 1941, the grape harvest in the coastal region of Cherchel, Algeria, was reduced by about 60 per cent. as a result of drought and attack by *Oidium* [*Uncinula necator*]. The more important losses were caused by the fungus, and in some estates these reached 80 per cent. Normally three applications of sublimated sulphur are made, the minimum quantity applied during the season being 150 kg. per ha., though in some years this figure reaches 200 kg.

The first serious signs of infection were noted in the second fortnight in May, and in three or four days the vines were completely infected. This was due partly to mists in April and May, but much more to lack of sulphur, the entire amount for the season being only 48 kg. By the end of May, the only healthy vines were those that had received the two first applications, either of sublimated sulphur or black sulphur. In some cases, wettable sulphurs gave good results. The most resistant vines were Cot de Chéragas, Aramon, and Grenache, followed by Alicante-Bouschet and Grand Novi (moderately resistant) and then by Carignan and Cinsault.

The two early treatments were the most effective, the most economical, and the easiest to apply.

Morel (G.). **Essais de laboratoire sur le mildiou de la Vigne.** [Laboratory tests on Vine mildew.]—*Rev. Vitic., Paris*, xcii, 7, pp. 210–213, 4 figs., 1946.

Experiments are described in which the author maintained tissue cultures of vine inoculated with *Plasmopara viticola* [*R.A.M.*, xxv, p. 94]. The application of this method to the investigation of various problems is discussed. Preliminary greenhouse tests confirmed the efficacy of dinitro 2–6 sulphocyano 1–4 chlorobenzene and zinc dimethyldithiocarbamate against *P. viticola*, while two organic compounds, methyltrichloracetamide and chlorobenzene-methylol-chloracetamide were also found to be effective.

Verona (O.) & Mencarini (G.). **Sul 'rot bianco' della Vite.** [On 'white rot' of the Vine.]—*Ann. Fac. agr. Pisa*, N.S., iii, 18, pp. 73–101, 13 figs., 1 diag., 1940. [French, German, and English summaries. Received August, 1946.]

In this paper, the authors after briefly reviewing the history of earlier investigations into vine white rot (*Coniothyrium diplodiella*) [*R.A.M.*, xv, p. 200; xxiii, pp. 91, 206, *et passim*] and describing the symptoms of the disease and the conditions under which it develops, give a full account of their cultural, morphological, and physiological studies on the fungus. As regards its systematic position, Viala and Ravaz in 1879 stated that they had found (on vine branches kept in sterile sand) a perithecial form, *Charrinia diplodiella*, which they regarded as the perfect state. This was transferred by Berlese to *Metasphaeria*, but has not been observed since, even in three years' work by the writers. In these circumstances it is difficult to accept the conclusion of Viala and Ravaz. The paper concludes with brief recommendations for control, and there is a bibliography of 49 references.

Galles (P.). **Le court-noué dans la basse plaine narbonnaise.** [Court-noué in the lower plain of Narbonne.]—*Rev. Vitic., Paris*, xcii, 8, p. 227, 1946.

In support of the view that *Phylloxera* [*vastatrix f. radicicola*] is not alone responsible for vine court-noué [*R.A.M.*, xxv, p. 491] the author instances a plantation of ungrafted vines near Narbonne planted between 1880 and 1890 in the alluvial plain of the river Aude and subject every year to flooding from the canal in the vicinity. The planting was highly successful, but in 1900 court-noué was noted on 50 to 200 vines, and the disease continued to spread. In view of the annual floods the insect could not possibly be incriminated in this case [cf. ibid., xix, p. 67], and, in fact, it has never been observed locally.

The first signs of the disease appeared in badly drained patches after the flood water had subsided. The worst affected vines were invariably those most deeply planted. After destruction of the vines and replanting the disease reappeared two or three years later. Cuttings taken from affected branches and raised in the greenhouse in pots of soil from a locality where no vines were grown all gave vines with court-noué. The author concludes that affected plants must secrete certain toxins or that if there is a virus it affects not only the vine organs but also the soil in which the vine is planted.

Tarassevich (L. M.). **Determination of the isoelectric point of virus proteins by the staining technique.**—*C.R. Acad. Sci., U.S.S.R.*, N.S., xlvii, 9, pp. 666–668, 4 graphs, 1945.

Experiments are described designed to develop a staining technique for determining the isoelectric point of virus proteins, seeking to utilize for this purpose the dependence of staining on pH. A drop of a crystalline suspension in ammonium sulphate of the tobacco mosaic virus, purified by the method of Rizhkov and Gromyko [*R.A.M.*, xvii, p. 708], was placed on a slide, air-dried, fixed with 96° alcohol, stained with the buffer staining solution for five minutes, and washed with the buffer solution. The intensity of staining was estimated by a five-mark scale, and the results showed that the virus crystals stain readily with acid fuchsin at low pH values and with difficulty at high ones. For basic fuchsin the relations are reversed. From the average of the pH values corresponding to the minimum intensity of their staining by acid and by basic fuchsin is obtained the isoelectric point of the virus protein tested, which in this case was pH 3·8, compared with pH 3·3 as determined by precipitating the protein in the presence of salts. The corresponding figures for cucumber mosaic were pH 4·2 and 4·8, and for 'zakuklivanie' [pseudo-rosette] of oats [ibid., xxiv, p. 13], 5·4 and 5, respectively. The technique has therefore relatively low precision but is simple and speedy.

Stubbs (L. L.). **A simple hand duster for the application of abrasives and insecticidal dusts in plant virus transmission studies.**—*J. Aust. Inst. agric. Sci.*, xii, 1–2, pp. 53–54, 2 figs., 1946.

A hand duster has been constructed from an Erlenmeyer flask, capacity 250 ml., and a De Vilbiss atomizer bulb, and with this consistently good results have been secured during the past three years in applying carborundum to the leaves of test plants to facilitate the mechanical transfer of certain plant viruses. By this simple device much time is saved as compared with the salt-shaker recommended for the same purpose [*R.A.M.*, xv, p. 737].

It can also be used to apply a commercial 3 per cent. nicotine dust through the muslin tops of cylindrical celluloid cages used for covering plants after aphid transfers, thus enabling the dust to reach all parts of the plant and increasing the fumigatory effect of the nicotine. Moreover, the aphids are killed without injuring the test plants.

Smith (K. M.). **Virus diseases of farm and garden crops.**—111 pp., 15 pl., 13 figs., Worcester, Littlebury & Co., Ltd., [?1946]. 10*s.* 6*d.*

This interesting and useful work is primarily intended for practical agriculturists and horticulturists, but it is also hoped that it will prove acceptable to the student and be of value to the busy advisory officer. The first two chapters deal with the more elementary technique of plant-virus study and the rest of the book gives descriptions and illustrations of the common virus diseases of farm and garden crops (potato, sugar beet, and other root crops, pulse and pasture crops, vegetables, soft fruit and hops, ornamental plants, and some medicinal and weed plants), with information on their control. Each chapter is provided with a list of literature and figures are given of the insect vectors.

Conners (I. L.) & Saville (D. B. O.). **Twenty-fifth Annual Report of the Canadian Plant Disease Survey, 1945.**—xvii+126 pp., 1946. [Mimeographed.]

In the section on new or noteworthy diseases in this report [cf. *R.A.M.*, xxv, p. 60] it is stated that during 1945 stem [black] rust (*Puccinia graminis*) was virtually absent in fields of resistant wheat varieties in Manitoba, though the amount of infection on susceptible varieties in experimental plots indicated that

heavy losses would have been sustained if the local farmers had continued to grow the old varieties. Wheat leaf [brown] rust (*P. triticina*) was severe in most parts of Canada except in the dry areas of Alberta and western Saskatchewan; Regent and Renown were almost as severely affected as Thatcher, as a result, apparently, of the presence of races of *P. triticina* to which they are susceptible.

Oat crown rust (*P. coronata*) was very prevalent in Manitoba and appeared in epidemic form in many parts of Ontario, Quebec, and the Maritime Provinces. Erban and other varieties with a similar type of resistance showed widespread damage in sharp contrast to the resistance displayed by Erban in 1938, this failure being due to the increasing prevalence of races of crown rust to which these varieties are susceptible. Oat black rust was somewhat severe in Manitoba and eastern Saskatchewan and locally in some parts of eastern Canada. The Ajax variety, hitherto resistant, was severely affected over most of Manitoba, while Vanguard was more heavily attacked than before, this being due to an unprecedented prevalence of races to which these varieties are susceptible. The severity of black rust in parts of eastern Ontario led to the initiation of a campaign to eradicate barberry and buckthorn [*Rhamnus* spp.] locally.

Wheat take-all (*Ophiobolus graminis*) was common, and in some fields severe, in north-eastern Saskatchewan; in Manitoba, where it seldom occurs, a severe outbreak was recorded in one field. It appears to be increasing in winter wheat in southern Ontario, and was recorded for the first time at St. Anne de la Pocatière, Quebec.

Lucerne bacterial wilt (*Corynebacterium insidiosum*) [ibid., xxv, p. 101] has now spread to the northern seed-producing areas of Alberta, and was reported for the first time in Manitoba. Crown rot due to a low-temperature Basidiomycete [ibid., xxiii, p. 3] was noted for the first time in southern Saskatchewan, where it was found at Swift Current. Crown wart (*Urophlyctis alfalfae*) [ibid., xxiv, pp. 62, 452], a new lucerne disease in Canada, was observed in British Columbia and in two fields at Chilliwack.

A destructive fungus root rot of flax, due to *Phoma* (?) *exigua* [ibid., xxi, p. 531], was recorded for the first time.

Bacterial ring rot (*Corynebacterium sepedonicum*) [ibid., xxv, p. 316] is still one of the most important diseases of potatoes in Canada, though no longer a serious menace to the certified seed industry. Its occurrence in Prince Edward Island and British Columbia is confined to sporadic infections, and in Alberta it continues to diminish. Fewer cases were found also in Ontario, and of these, fewer were on farms where the disease had been present before. It reached epidemic proportions in Manitoba, however, where an organized campaign is required to bring it under control. From the increased number of infections found in Saskatchewan in 1945, an extended survey would appear to be necessary in this province. Potato pink rot (*Phytophthora erythroseptica*) [ibid., xxv, p. 8] has now been reported from Manitoba and Quebec. Evidence obtained indicated that the occurrence of leaf roll is correlated with the abundance and activity of the aphid population, whereas mosaic incidence depends in general on the degree of the initial freedom of the seed from the disease.

Halo blight (*Pseudomonas medicaginis* var. *phaseolicola*) and other bacterial blights of beans [*Phaseolus* spp.] are on the increase. Beet downy mildew (*Peronospora schachtii*) was reported from the British Columbia interior. Wilt due to *Fusarium oxysporum* [? *F. bulbigenum* var. *niveum* f. 2: ibid., xxiv, p. 351] was very destructive in important melon-growing areas in Ontario. Onion yellow dwarf [ibid., xxiv, p. 133], a disease new to Canada, was found in British Columbia. Observations in Ontario indicated that black pod blotch due to *Alternaria raphani* [ibid., xxv, p. 204] can be a destructive disease of the radish seed crop. A strain of *Cladosporium fulvum* attacking Vetomold 121 tomatoes appeared in south-western

Ontario. Apple scab (*Venturia inaequalis*) was exceptionally severe from Ontario eastwards, defoliation and crop loss being common in inadequately sprayed orchards. What is suspected to be pear stony pit [ibid., xxiv, pp. 22, 402] was found in Ontario, the first record in eastern Canada. Gooseberry downy mildew (*Plasmopara ribicola*) [ibid., x, p. 42] occurred in Ontario, this being the first record for Canada. Strawberry red core (*Phytophthora fragariae*) [ibid., xxiv, pp. 128, 325], recently found for the first time in British Columbia, caused heavy losses in the Fraser Valley. Dutch elm disease (*Ceratostomella ulmi*) [ibid., xxv, p. 61] is more widespread in Quebec than was indicated by the preliminary survey in 1944.

Other new or interesting records include *Dahlia* [tomato] spotted wilt in Manitoba and Quebec, *Pseudomonas syringae* on lilac in Alberta and Manitoba, and *Botrytis tulipae* on tulip at Ottawa.

**Nómina de determinaciones de enfermedades de origen parasitario efectuadas durante el año 1945 por la Sección Fitopatología del Departamento de Sanidad vegetal, que no han sido mencionadas anteriormente para nuestro país.** [List of determinations of diseases of parasitic origin made during the year 1945 by the Phytopathology Section of the Department of Plant Health, which have not been reported previously for our country.]—*Agric. tec., Chile*, v, 2, p. 224, 1945.

Included in this list of new records for the parasitic mycoflora of Chile determined in 1945 [cf. *R.A.M.*, xxv, p. 280] are *Myxosporium corticola* [ibid., xxiii, p. 476] on pear, *Penicillium expansum* on apple, *Ramularia cynarae* on globe artichoke (*Cynara scolymus*) [ibid., xxiv, p. 387], and *Septoria ribis* [*Mycosphaerella grossulariae*] on blackberry (*Rubus ulmifolius*).

Rybak (B.). **Actions bactériostatiques chez Pelargonium zonale et crown gall.** [Bacteriostatic effects of *Pelargonium zonale* and crown gall.]—*C.R. Acad. Sci., Paris*, ccxxiii, 16, pp. 586–587, 1946.

G. Amoureux (Thesis, Paris, 1934) reported the inhibition of growth of the hop and *Chrysanthemum* [*frutescens*] strains of crown gall (*Phytomonas* [*Bacterium*] *tumefaciens*) [*R.A.M.*, xxv, p. 386] by the admixture with the agar medium of an aqueous extract of *Pelargonium zonale*. The last-named plant contains appreciable quantities of phenolic compounds, the fungicidal effects of which have repeatedly been observed.

The author placed fragments, 20 mm. in length, of young *P. zonale* stems in tubes of nutrient agar, which were then inoculated with one or other of the above-mentioned strains of *Bact. tumefaciens* and incubated at 29° C. The growth of the organism was definitely inhibited, at a maximum distance of 4 to 5 mm. from the stem fragments, after 48 hours, and no appreciable diminution of the bacteriostatic effect followed an hour's exposure of the plant material to a temperature of 55°. It would appear from these tests that the phenolic components of plants may contribute, in a modest degree only, to their resistance to crown gall.

Ekstrand (H.). **Höstsädens och vallarnas övervintring 1945–46.** [The overwintering of autumn cereals and grasses 1945–46.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1946*, 3, pp. 44–46, 1946.

Snow mould of cereals [*Calonectria graminicola*: *R.A.M.*, xxv, p. 496 and next abstract], though widespread in Sweden during the winter of 1945–6, did not materially reduce crop yields except in a few districts where the snow cover was particularly heavy.

*Typhula itoana* was present in a number of places on barley, wheat, rye, and various pasture grasses, but did not in general cause appreciable damage. *T. borealis*, often combined with *C. graminicola*, was troublesome in regions of heavy

snowfall, in one of which the two pathogens were jointly responsible for a 60 to 70 per cent. decrease in a wheat rotation.

The depredations of *Sclerotinia borealis* on rye and grasses increased in severity and extent with the approach to the Arctic Circle, where the timothy [*Phleum pratense*] crops, for instance, were largely or wholly decimated.

Clover was widely attacked by *S. trifoliorum*, usually in a mild form, and in the far north also by *T. borealis*.

Ekstrand (H.). **Förekomsten av utvintringssvampar pa höstsäd och vallväxter i Finland.** [Occurrence of fungi causing winter injury to autumn cereals and pasture crops in Finland.]—*Växtskyddsnotiser, Växtskyddsanst., Stockh., 1946*, 4, pp. 49–55, 1946.

In view of the prevalence and severity of *Sclerotinia borealis* on autumn-sown cereals and among pasture crops in northern Sweden [see preceding abstract] and its presence in the U.S.S.R. as far south as Leningrad (or farther in the interior of the country), it was of interest to determine the exact distribution of the pathogen in Finland, through which a trip was accordingly made for the purpose in the spring of 1946. At Tervola, on the river Kemi, the fungus was responsible for a reduction of 20 per cent. in a number of rye fields, while in the same district some pasture crops, especially first-year stands, sustained heavy damage. Rye and grasses also suffered extensively from *S. borealis* at Apukka, just north of the Arctic Circle, and at Tohmajärvi, quite near the new Russo-Finnish frontier. At Maarinka the fungus caused a loss of about 20 per cent. in Viatka rye on marshy ground, while some of the timothy [*Phleum pratense*] crops were reduced by 50 per cent. at least.

The distribution of *Typhula borealis* [loc. cit.] was largely co-extensive with that of *S. borealis*, but in general the former species was of little importance. The snow mould (*Fusarium*) [*nivale*: *Calonectria graminicola*] was also a frequent and injurious concomitant of *S. borealis*.

In a varietal experiment at Apukka, Greus, a 'land' rye from the vicinity of Uleåborg, proved to be the most resistant, producing a stand of 95 to 100 per cent., while the corresponding figures for Ensi, Toivo, Oiva, and Onni were 75, 40 to 50, 20 to 25, and 20 per cent., respectively.

In a fertilizer trial with rye on marshy ground at Tohmajärvi, 60 to 70 per cent. of the stand in the plots receiving no amendments was lost through the attacks of *S. borealis*, *T. borealis*, and *C. graminicola*, whereas in those given potash, phosphorus, and nitrogen, singly or combined, the reduction did not exceed a maximum of 10 to 20 per cent. The inclusion of nitrogen in the fertilizer did not appear to enhance the beneficial effects of the phosphorus and potash, which were presumably responsible for the superior resistance of the treated stands. The infection of *P. pratense*, following rye, by *S. borealis* and *T. borealis* was also reduced by soil treatments with phosphorus and potash.

Clover rot (*S. trifoliorum*) was not, in general, excessively severe in the districts visited. At the Ylistaro Experiment Station it occurred in a very erratic form, sparing the first year's crop but causing heavy depredations in the second (15 to 20 per cent.) and especially in the third (75 to 80).

Gottlieb (D.) & Garner (J. M.). **Rust and phosphorus distribution in Wheat leaves.**—*Phytopathology*, xxxvi, 7, pp. 557–564, 1 fig., 1946.

No consistent differences in the total radio-phosphorus content were found between healthy specimens of entire Little Club wheat leaves and those inoculated with *Puccinia graminis* race 34 at the Delaware Agricultural Experiment Station [*R.A.M.*, xxv, p. 272]. In inoculated leaves the differences in radio-phosphorus content between the infected distal and the uninfected basal portion were much

greater than the differences between comparable areas in sound plants. The distal parts always contained more radio-phosphorus, the average differences (in counts of radio-activity per gm. dry weight) between them and the basal in inoculated and uninoculated leaves being 4,667 and 1,967, respectively. The radio-phosphorus was shown by radiographs and photographs to be accumulated in the rusted parts of the leaves and concentrated in the parasitized areas. The specific activity of phosphorus in the uredospores was lower than in whole uninoculated or rusted leaves (17,200, 20,400, and 21,067 counts per gm., respectively).

RAPIN (J.). **Essais de lutte contre la carie du Froment (Tilletia tritici).** [Control tests against Wheat bunt (*Tilletia tritici*).]—*Rev. romande Agric., etc., 1946*, 8, pp. 65–66, 1946.

In tests carried out at Lausanne in 1945–6, wheat seed-grain of different varieties and hybrids after preliminary treatment in water at 53° C. for ten minutes was inoculated with spores of *Tilletia tritici* [*T. caries*] and sown in December in soil of pH 7·3 in a greenhouse, the pots after germination being placed in the open until field planting in February. At maturity, Mont-Calme 405 B (Plantahof × Hybrid 245), Mont-Calme 245, Oerlikon (Rimpauer früher Bastard × Strickhof), Huron, Mont-Calme 404 (245 × Plantahof), Mont-Calme 410 B (CD × Huron), Précoce CD, Mont-Calme 405 A (Plantahof × 245), Mont-Calme 268, Mont-Calme 408 A (Plaine × Huron), Mont-Calme 410 A (CD × Huron), Oerlikon No. 13/16 (Plantahof × Tassilo), Oerlikon No. 56/96 (Trubilo × Plantahof), Mont-Calme 408/B (Plaine × Huron), Plaine, and Plantahof showed, respectively, 84, 78, 72, 70, 68, 63, 61, 60, 52, 49, 47, 46, 45, 30, 24, and 23 per cent. infection.

When Mont-Calme 268 seed was washed and inoculated as before, treated with various fungicides [cf. *R.A.M.*, xxv, p. 207], and similarly grown, the plants from seed treated with 1 per cent. copper sulphate, 1 per cent. Bordeaux mixture, 1 per cent. formaldehyde (each for 30 minutes), and the following dusts, each at 2 per cent., viz., precipitated copper carbonate, abavit, ceretan [ceresan: ibid., xxiii, p. 330], prosat, graminon, and zyma showed, respectively, 4, 13·3, 0, 9, 0·3, 0, 1, 3·3, and 1·3 per cent. infection compared with 0 and 47·3, respectively, in the uninoculated and inoculated controls. When inoculated wheat seed was grown in pots of soil at pH 8·3, 7·3, and 5, infection was, respectively, 16·7, 47·3, and 0·3 per cent. In a further experiment, spores collected in 1944 and 1945 gave, respectively, 47·3 and 51 per cent. infection.

MUNDKUR (B. B.). **Studies in Indian cereal smuts. VIII. Nomenclature of Indian smut fungi and probable modes of their transmission.**—*Indian J. agric. Sci.*, xv, 2, pp. 108–110, 1945.

A synoptic table is presented showing the common names of Indian cereal smuts, their scientific names according to the International Rules of Botanical Nomenclature, their designations in previous practice, and their modes of transmission.

ELLIOTT (CHARLOTTE) & JENKINS (MERLE T.). **Helminthosporium turcicum leaf blight of Corn.**—*Phytopathology*, xxxvi, 8, pp. 660–666, 1 fig., 1 graph, 1946.

The results are presented of field inoculation tests of maize, undertaken at Beltsville, Maryland, in 1944, for resistance to *Helminthosporium turcicum* following the severe epidemic of leaf blight in 1942 [*R.A.M.*, xxii, p. 474].

As a result of the 1944 field inoculations, infections even heavier than in the epidemic of 1942 were induced. About five acres of maize were inoculated twice a week from the end of June to the time when the plants came into tassel and the disease spread rapidly during August and September. Leaf-blight ratings of 200 inbred lines, 176 crosses, and 184 double crosses in 1942 and 1944 showed most of these to be susceptible and earlier strains to be more susceptible than late-maturing

ones. NC34 proved the most resistant; CI.23, K175, Ky114, Mo21A, T49B, T105B, K155, CI.15, CI.16, and T×206 showed traces only of infection. Usually, the resistance was transmitted to hybrid progeny.

VENKATARAYAN (S. V.). **Mosaic disease of Ragi (Eleusine coracana Gaertn.).**—*Curr. Sci.*, xv, 9, pp. 258–259, 1 fig., 1946.

Previous to the writer's observation of the extensive infection of *Eleusine coracana* by mosaic in several localities of Mysore State in June and July, 1946, there was apparently only one record of the disease on this host, namely, that of McRae from Madras in 1928 [*R.A.M.*, viii, p. 424]. The affected plants in Mysore were severely infested by *Aphis maidis*. Sorghum in the vicinity showed mosaic symptoms from which sugar-cane, however, was free. *E. coracana* is one of the grasses listed by K. M. Smith [ibid., xvii, p. 52] as bearing chlorotic foliar patterns resembling those of the maize streak virus, but the appearance of the author's specimens was more suggestive of mosaic.

BRIEGER (F. G.) & MOREIRA (S.). **Experiências de cavalos para Citrus. II.** [Experiments with rootstocks for Citrus. II.]—*Bragantia, S. Paulo*, v, 10, pp. 597–658, 6 figs., 3 diags., 1945. [English summary.]

This is a progress report, embodying observations made since 1942, on the grafting experiments which are being carried out in São Paulo, Brazil, to determine the most suitable rootstocks for the leading commercial citrus varieties grown in the State, viz., Baianinha and Pêra oranges and Marsh Seedless grapefruit. All combinations involving sour or bitter-sweet orange rootstocks showed definite signs of the 'tristeza' form of root rot [*R.A.M.*, xxv, p. 558 and next abstract] while the scions grafted on citron and ponderosa lemon (*Citrus limonia*) presented evidence of incompatibility.

SARAVIA (G.). **Algunos aspectos de sanidad vegetal en Brasil.** [Some aspects of plant health in Brazil.]—*Simiente, Santiago de Chile*, xvi, 1, pp. 47–50, 2 figs., 1946.

During a recent visit to Brazil the writer ascertained that the 'tristeza' form of citrus root rot [see preceding abstract] was responsible in the principal citrus-producing State of São Paulo alone for the death of over 4,000,000 plants in the last four years. So grave a view of the situation is taken by the Peruvian and Chilean governments that they have closed their frontiers to the importation of citrus plants, seed, and propagating material.

FAWCETT (H. S.). **Stubborn disease of Citrus, a virosis.**—*Phytopathology*, xxxvi, 8, pp. 675–677, 1946.

Experimental evidence is presented to show that the stubborn disease of Navel orange trees first described by Fawcett *et al.* in 1944 [*R.A.M.*, xxiii, p. 294] is of virus origin. Sweet orange trees, grafted in the seedling stage in March, 1939, with buds from trees with stubborn disease were top-worked with buds from a healthy Navel in May, 1943. By March, 1946, the growth from the Navel buds had not only developed the branch and leaf symptoms characteristic of stubborn disease, but some of the fruits showed the 'acorn' symptoms [loc. cit.]. Healthy buds from the same source inserted into healthy trees at the same time produced normal branches, leaves, and fruit. The symptoms on the diseased trees developed slowly. The author gives to the virus the name *Citrivir pertinaciae*.

KLOTZ (L. J.) & ZENTMYER (G. A.). **Fungicides for the control of brown rot of Citrus.**—*Calif. Citrogr.*, xxxi, 11, p. 430, 1946.

Among many fungicides tested in the endeavour to find a material that would protect citrus fruits against *Phytophthora citrophthora* without aggravating the

damage caused by subsequent fumigation with hydrogen cyanide as copper sprays do, the following were found worthy of further investigation: disodium ethylene bisdithrocarbamate [dithane] with zinc sulphate and lime, tetra-chloroquinone, zinc dimethyl dithiocarbamate [methasan], and 2, 3-dichloro naphthoquinone. The effectiveness of the copper-containing materials was evident throughout. An iron-copper spray was outstandingly good, but caused surface injury. Under field conditions, 1 lb. spergon per 100 gals. became relatively ineffective on lemons after a few weeks. Dithane showed promise. Zerlate [*R.A.M.*, xxv, p. 397] appears to be worthy of commercial trial where the danger of copper damage is important.

Dastur (J. F.). **Notes on Corticium album Dast. and C. salmonicolor B. and Br.**—*Curr. Sci.*, xv, 7, pp. 192–193, 1946.

A re-examination of the type material of the fungus on citrus in India described (in English only) by the author as *Corticium album* (ante-dated by *C. album* Britz.) and tentatively referred by D. P. Rogers to *Pellicularia* [*R.A.M.*, xxii, p. 372] has led to the acceptance of this conclusion, and the species is accordingly renamed *P. alba* n.sp., with a Latin diagnosis.

A comparative study of the author's specimens of *C. salmonicolor* from citrus in India and those from *Hevea* rubber, citrus, and *Acacia arabica* in Herb. Crypt. Ind. Orient., New Delhi, demonstrated the complete identity of all the material. The substitution of the name *P. salmonicolor* (B. & Br.) n.comb. for *C. salmonicolor* B. & Br. is therefore proposed.

Chapman (H. D.). **What we know, and don't know, about diagnosis of nutrient deficiencies and excesses of Citrus.**—*Calif. Citrogr.*, xxxi, 11, pp. 416–417, 1946.

The author succinctly reviews the data at present available on which it is possible to diagnose citrus nutritional disorders. Three tables are provided, one listing the specific yield, tree, and quality problems in which soil conditions and fertility may play a part, another setting out the factors other than nutrition that should be considered in evaluating citrus troubles, and the third presenting for each element the tests and types of information useful in diagnosing specific deficiencies and excesses.

Thorold (C. A.). **A note on results from spectrographic analysis of Coffee material.**—*Ann. appl. Biol.*, xxxiii, 2, pp. 177–178, 1946.

From an investigation of stems and beans by spectrographic analysis it is concluded that Elgon dieback of coffee [*R.A.M.*, xxiv, p. 368] cannot be attributed to a deficiency of any major or minor elements. In the stems, a large difference between susceptible and resistant varieties was recorded only in the case of zinc. Injections into trees with solutions containing zinc failed to confer improvement on disease resistance.

Halperin (L.). **Fenómenos a considerarse con respecto al agente etiológico de la 'mancha angular' del Algodonero en nuestro país. [Phytomonas malvacearum (E. F. Smith) Bergey.] Comunicación preliminar.** [Phenomena to be considered with regard to the etiological agent of 'angular spot' of Cotton in our country [*Phytomonas malvacearum* (E. F. Smith) Bergey]. Preliminary note.]—*Physis, B. Aires*, xv, 47, pp. 99–102, 1 fig., 1939. [Received September, 1946.]

Cultures of *Phytomonas* [*Xanthomonas*] *malvacearum* from cotton in Argentina differ in certain respects from the descriptions given by E. F. Smith and other bacteriologists. For instance, the colonies in the densely sown portions of nutrient agar plates are yellow, circular, smooth, and glistening; litmus milk is acidified; growth on potato slices is only moderate; nitrates in a synthetic nitrated medium

are reduced to nitrites; and a number of carbohydrates, including glucose, levulose, lactose, saccharose, maltose, sorbitol, mannitol, and mannose, are utilized with production of acid in each case.

Biraghi (A.). **Sulle 'Alternaria' del Cotone con particolare riguardo alla 'A. macrospora' Zimm.** [On the *Alternaria* species affecting Cotton, particularly with respect to *A. macrospora* Zimm.]—*Boll. Staz. Pat. veg. Roma*, N.S., xxii, 3–4, pp. 181–192, 1 pl.; 4 figs., 1942. [Received June, 1946.]

During 1939 and 1940, the author observed diseased cotton leaves in Italy showing different forms of leaf symptoms. The simplest consisted of round, dark violaceous-red spots 1 to 2 mm. in diameter. Others were slightly larger, irregular, and had a central circular area of brown, dry tissue which often fell out. In more serious infections the spots were sometimes over 1 cm. in diameter and had a dry, white central area which did not usually become detached. In favourable environmental conditions the spots gradually enlarged, became confluent, and involved a large part of the leaf, the affected leaves finally becoming detached. The dead parts of the larger spots bore two distinct types of *Alternaria* conidia. The more mildly affected leaves, after being placed in a damp chamber, developed conidia with a long, hyaline beak, here identified as *A. macrospora*. Most of the conidia on the larger lesions resembled those of the *Alternaria* previously found by the author on the fibres of mummified cotton bolls [*R.A.M.*, xvii, p. 674] and having a short beak, but mixed with them were conidia of the longer-beaked type. Observations in two localities showed that in one the conidial measurements of the latter were: total length 86 to 166·5 $\mu$, length of beak 38 to 101·8 $\mu$, and diameter of conidia 14 to 19 $\mu$, while in the other the corresponding figures were 132 to 187·5 $\mu$, 62 to 109 $\mu$, and 17 to 21·5 $\mu$, respectively.

A careful comparison of the characters of these two types of *Alternaria* showed that the author's earlier view that the one found on the fibres of diseased cotton bolls belonged to *A. macrospora* must be discarded. The form with the long beak is unquestionably that species, while the one with the shorter beak, which is identical with that formerly found in the mummified bolls and with that referred by Hopkins in Rhodesia to *A. gossypina*, should be included, it is claimed, in *A. cheiranthi* sensu Wiltshire.

According to the author's observations, *A. macrospora* attacks cotton very frequently, but the seriousness of the lesions it produces on the leaves depends largely on humidity conditions. Generally, the fungus produces small, dark-red spots, but in very damp conditions it develops abundantly in the leaf tissues and causes a large part of the leaf surface to wither, after which the affected leaves fall off. In such cases, the injury to the tissues is aggravated by the other species, which becomes established subsequently and behaves as a saprophyte.

Couch (J. N.). **Two species of Septobasidium from Mexico with unusual insect houses.**—*J. Elisha Mitchell sci. Soc.*, lxii, 1, pp. 87–94, 2 pl., 4 figs., 1946.

Full descriptions are given of the two new species of *Septobasidium*, *S. fraxini* and *S. soleare*, found by the author in Mexico during 1940 in symbiosis with scale insects on ash trees and a small deciduous tree, respectively.

Viennot-Bourgin (G.). **Botrytis cinerea parasite des cultures de Lin en France. (Note préliminaire.)** [*Botrytis cinerea* parasitic on Flax crops in France. (Preliminary note).]—*Rev. Mycologie*, N.S., v, 2–3, pp. 55–63, 1 pl. (facing p. 86), 2 figs., 1940. [Received July, 1946.]

Flax grown near Lannion and Landivisiau, Brittany, from seed of certain new, white-flowered varieties (especially Hermine) imported from Friesland showed

bare patches up to 3 sq.m. in area, amounting in some fields to about one-quarter of the total surface sown. In these places most of the few plants that did come up were short and weak, and bore very short, unequal secondary branches. They were yellow and showed slate- or brownish-grey, oval, necrotic spots up to 1·5 cm. long in the middle and lower parts of the stems. From the surface of these lesions the author isolated a fungus agreeing with the description of *Botrytis cinerea* [*R.A.M.*, xix, p. 597; xxiii, pp. 17, 132] and which could also be referred to *B. cinerea* f. *lini* [ibid., ix, p. 246].

To ascertain whether the disease was seed-borne, the author germinated four lots of seed of different origin (including Hermine grown in Friesland) in sterile conditions. Percentage germination ranged from 96 to 98·5, but six days after the emergence of the shoot, the Hermine plants showed infection by *B. cinerea*, though the other varieties remained unaffected. When seed from the Hermine plants was shaken up in distilled water and some of the water placed in a culture tube, four days later the conidiophores of *B. cinerea* developed, with other species, including *Penicillium* and some Mucoraceae.

Millington (A. J.). **Wada, a rust-resistant Flax variety.**—*J. Aust. Inst. agric. Sci.*, xii, 1–2, pp. 50–51, 1946.

In this note recording the development of the rust[*Melampsora lini*]-resistant flax variety Wada it is stated that selected lines crossed with Concurrent have yielded strains which combine the resistance and early maturity of Wada with the greater strain strength and higher seed yield of the other parent. Resistance appears to be inherited in a simple manner and it is thought that the gene or genes concerned may be the same as those of Russian resistant varieties.

Wilsie (C. P.) & Reddy (C. S.). **Seed treatment experiments with Hemp.**—*J. Amer. Soc. Agron.*, xxxviii, 8, pp. 693–701, 1946.

A tabulated account is given of experiments in Iowa to determine the value of various hemp seed treatments as means of increasing the stands to cover the greatly extended acreage demanded by the war-emergency programme [*R.A.M.*, xxiii, p. 438]. In one greenhouse test on field soil heavily infected by [unspecified] plant pathogens, the application of spergon, arasan, and semesan jr. at the rate of 2 oz. per 50 lb. seed augmented the stand by 100 per cent. or more [cf. ibid., xxv, p. 501], while in another two spergon alone (1·5 or 3 oz.) and the same plus new improved ceresan (80 : 20) produced increases of 33 to 50 per cent. In three years' field trials early plantings (20th April to 1st May) of high-grade seed were not materially benefited by the treatments, but an improvement both in stand and straw yield was frequently observed in the later ones (10th May to 15th June). In a test with seed sown after a year's storage, new improved ceresan and arasan both increased stand but not yield in an early planting (20th April), while both were favourably affected in the later one of 30th May. Older seed did not respond to any of the treatments.

Smith (O. F.). **Effect of soil temperature on the development of Rhizoctonia root canker of Alfalfa.**—*Phytopathology*, xxxvi, 8, pp. 638–642, 1 fig., 2 graphs, 1946.

The influence of soil temperature on the development of root canker of lucerne [*R.A.M.*, xxiii, p. 109] caused by *Rhizoctonia* [*Corticium*] *solani* is further demonstrated by the author, who shows that the optimum temperature for the growth of the pathogen both in culture and on the host is between 24° and 30° C. In the field very few cankers were observed at a soil temperature below 20° or above 35°

after 50 days. Few cankers developed at temperatures lower than 20° in the spring, and their development ceased in autumn after the soil temperature had dropped to about 20° or lower.

Weimer (J. L.). **Lespedeza anthracnose.**—*Phytopathology*, xxxvi, 7, pp. 524–533, 3 figs., 1946.

An anthracnose of annual *Lespedeza* caused by a strain of *Glomerella cingulata* is described from the Georgia Agricultural Experiment Station. The leaflets of affected plants bear variable numbers of roughly circular, elliptical, or angular, brownish lesions, 1 to 5 mm. in diameter, of which a single one suffices to cause shedding. On the petioles and stems the dark brown to nearly black lesions are circular or linear: the stems of young seedlings may be completely girdled and the plants killed. The disease is favoured by the wet periods of late spring and early summer and tends to disappear during the subsequent dry weather. The strain of *G. cingulata* responsible for the infection of *Lespedeza* was shown to differ from the apple, lupin [*R.A.M.*, xxii, p. 299], and *Chamaecrista* [ibid., xxiv, p. 242] isolates by inoculation tests, in which only the first-named attacked its own host. In general, *L. striata* appears to be more susceptible to anthracnose than *L. stipulacea*, and control may be sought, if necessary, by the development of resistant varieties from strains such as F.C. 31249 of the latter species.

Berg (A.) & Clulo (Genevieve). **The relation of manganese to internal bark necrosis of Apple.**—*Science*, civ, 2699, pp. 265–266, 1946.

After referring to the opinions of other workers that internal bark necrosis of apple trees is due to boron deficiency [*R.A.M.*, xvii, p. 400], the authors state that in six years' studies of this disorder in West Virginia they have failed to induce any of the bark symptoms by growing Red Delicious apple trees in boron-free sand cultures. Boron applications to affected trees in orchards did not correct the condition. Diseased tissues contained unusually high concentrations of both manganese and iron, and it was found, also, that the disorder was most prevalent on acid soils containing appreciable amounts of readily available manganese.

In June, 1943, 54 Red Delicious apple 'whips' were planted in crocks in soils A (from an affected orchard) and B (from an area where the disorder was not present). When established, some of the trees were given one application in each season of manganese (24 to 384 p.p.m. as manganese sulphate in solution) or iron (24 to 384 p.p.m. in the form of iron tartrate), or both. All the unaffected trees were placed in cold storage for the winter, and in April returned to the greenhouse. By the end of the third growing season (1945), of the trees in soil A, 90·7 per cent. of the treated and 58·3 per cent. of the untreated were affected, while in soil B, 54 per cent. of those treated were affected, and all the controls were healthy.

In April, 1945, a similar experiment was carried out with 144 trees using concentrations of from 96 to 1,536 p.p.m. of iron and manganese. By the end of the first season 75 per cent. of the treated trees and 45·4 per cent. of the controls in soil A had become affected, the corresponding figures for soil B being 31 and 0 per cent.

At the same time Red Delicious apple whips were grown in acid-washed sand cultures with the addition of manganese in concentrations ranging in geometric progression from 0·5 to 128 p.p.m. Within seven days the new leaves were showing signs of manganese toxicity which varied in intensity with the concentration used. At the end of the first growing season the disorder, in an exceptionally severe form, was apparent on the old and new wood of all four trees given the two highest concentrations of manganese, i.e., 64 and 128 p.p.m. The symptoms appeared at the same time in all trees grown in soil A whether in the greenhouse or in the orchard.

The addition of lime to eight crocks of soil A, decreasing the acidity from pH 4·2 to 6·5, successfully prevented the development of internal bark necrosis.

Hitz (C. W.) & Haut (I. C.). **Effects of waxing and pre-storage treatments upon prolonging the edible and storage qualities of Apples.**—*Tech. Bull. Md agric. Exp. Sta.* A14, 44 pp., 3 figs., 8 graphs, 1942. [Received September, 1946.]

Preliminary work at the Maryland Agricultural Experiment Station in 1936 having indicated the value of brytene 489A wax [*R.A.M.*, xxiv, p. 139] in prolonging the storage qualities of apples (*Proc. Amer. Soc. hort. Sci.*, xxxvi, pp. 470–478, 1939), a more comprehensive study of the effects of the treatment on Grimes Golden and Golden Delicious was undertaken from 1938 to 1940.

The wax, applied at the rate of one part to two parts of water, was highly effective in the reduction of weight loss and storage wilt, but it increased the severity of scald in Grimes Golden stored at 32° F. [*R.A.M.*, xxv, p. 507]. This drawback, however, could be mitigated or obviated by pre-ripening, involving a week's exposure to a temperature of 60° in a closed room, which likewise combated the disorder on unwaxed fruits. With progressive harvest dates there was a proportional reduction in scald corresponding to the greater maturity of the fruit.

Cash (Mary). **A contribution to a study of the physiology of decay in Apples.**—*Proc. Linn. Soc. N.S.W.*, lxx, 5–6, pp. 317–327, 15 graphs, 1946.

While these studies of the effect of environmental factors on the rate of decay in storage of Delicious and Granny Smith apples, due to the wound parasite, *Penicillium expansum*, and the 'bull's-eye rot' fungus, *Gloeosporium album* [*R.A.M.*, xviii, p. 743], suggest that the rate of radial advance of the rot depends on the stage of maturity, the district from which the fruit comes, and the variety, no adequate explanation was found for the differential decay observed between varieties. Inherent qualities of firmness of tissue and skin colour appeared to have no measurable influence on the rate of decay.

The rates of radial advance of *G. album* in apples were closely correlated with its growth in culture at different pH values [ibid., xxi, p. 384], which may possibly explain the differential rate of decay between varieties. So great, however, was the variation in the pH values of apples of the same maturity that differences in radial advance at different stages of maturity in the same variety could not be attributed to the hydrogen-ion factor.

Maximum development of *G. album* occurred at pH 4, the rate of growth falling progressively as the culture media became more acid. *P. expansum* growing on broth buffered by McIlvaine's standards was unaffected by pH, but using hydrochloric acid–potassium chloride buffers, optimal growth occurred at pH 3·6, which is nearly that of Granny Smith apple juice (3·5). Growth, however, was faster in fruit of the Delicious variety, yet in cultures of the same pH the growth rate was less.

The germination of the spores of *G. album* does not appear to be affected by temperature, but lower temperatures prolonged the dormant period of *P. expansum*. Spore age (up to 240 days) had no effect on the latent period or on the percentage germination of either fungus at different temperatures.

Ferguson (S. W.) & Holbeche (J. A.). **Boron deficiency in Pears. Symptoms and control measures.**—*Agric. Gaz. N.S.W.*, lvii, 5, pp. 241–243, 4 figs., 1946.

In the Kentucky area of New South Wales serious crop losses are caused in pears by boron deficiency [*R.A.M.*, xxiii, p. 334; xxv, p. 506], the symptoms of which are given, including varietal symptoms on fruits.

The control method recommended consists in making a soil application of borax at the rate of $\frac{1}{4}$ to 1 lb. per tree according to size (applications to small, non-bearing trees are not advised) in autumn, the borax being lightly chipped into the soil after

spreading. This should give effective control for three to five years at least, and no further dressing should be applied until the presence of cork is noted.

Sprays have also proved effective over a wide area, the concentrations used ranging from 1 to 2½ lb. borax per 100 gals. water. This may be combined with lead arsenate and applied at the calyx stage or with lime-sulphur for the first cover spray. Spraying should be practised every year.

Brown (J. G.) & Heep (D. M.). **Effect of streptomycin on budwood infected with Phytomonas pruni.**—*Science*, civ, 2696, p. 208, 1946.

At the Arizona Agricultural Experiment Station streptomycin, both crude and crystalline, was successfully used in the elimination from plum budwood of infection by *Phytomonas* [*Xanthomonas*] *pruni* [*R.A.M.*, xxv, p. 564]. In its crude form the drug was isolated from a culture of *Streptomyces* [*Actinomyces*] *griseus* and the crystalline preparation was supplied by Schenley Laboratories, Inc. Pieces of branches 5½ to 6½ in. long, bearing lesions up to 1 in. long, some almost girdling the branch and penetrating to the stele, were placed in beakers either in an upright position, with the basal 1½ in. in the streptomycin solution, or horizontally so that they were completely submerged. The beakers were then transferred to an enclosed chamber, subjected to negative pressure and maintained at a temperature of 22° to 25° C. The studies are still in progress, but it is already clear from cultural experiments that the application of crude streptomycin at a concentration of 6 to 8 Oxford units, or a concentrated dose of the crystalline preparation, acting overnight under the conditions described, resulted in perfectly clean budwood, which gave rise to healthy foliage, whereas the controls in distilled water yielded abundant growth of *X. pruni*.

Goidànich (G.). **Peach-tree decay in North Italy with phloem necrosis and degeneration of the cambium.**—*Int. Bull. Pl. Prot.*, xx, 5–6, pp. 33M–38M, 3 figs., 1946.

During the past seven or eight years peach trees growing in the Udine and Trieste Provinces of Venezia Giulia have shown a form of decay attended sometimes by a high rate of mortality. In one orchard, of some thousands of peach trees planted eight years before, and which in the spring of 1940 appeared to be in excellent condition, approximately 80 per cent. showed conspicuous symptoms during the summer and by the following spring 300 had died. In 1941 the disease had spread to almost all the healthy trees. A similar and equally serious condition was reported in 1940 from the area between Udine and Monfalcone on the Adriatic coast. The disease everywhere appeared to spread round the initial centres of the outbreak.

The leaves of the affected trees turned pale and showed red areas, particularly along the edges and veins. The edges rolled upwards and inwards, often with marked swelling. Vegetation was thin and concentrated near the top, rosette formations or witches' brooms developing at the extremity of each branch. During spring no pathological symptom appeared externally on the bark, but later on cracks and depressions appeared, accompanied by gum exudation. In an advanced stage the largest branches suddenly withered and the entire foliage might become affected before summer started. As a rule the trees died off during summer.

Internally, the median part of the phloem assumed a rust colour and later turned brown. This discoloration spread and in more advanced stages the entire thickness of the phloem was affected, the discoloration passing eventually into the wood. It was distinctly visible in one-year-old branches, but became arrested in the trunk at the graft level.

Profound degeneration of the cambium was present, and the phloem showed progressive swelling of the walls, followed by obliteration of the lumen, and succes-

sive gummosis. The changes in the woody tissues consisted mainly in a gummy degeneration of the associated tissues, but not the medullary rays.

No causal organism could be isolated and the symptoms were clearly not due to cold. The condition does, however, show marked similarity to non-parasitic leptonecrosis of fruit trees [*R.A.M.*, xiv, p. 320 *et passim*] and to various other non-parasitic disorders found in different parts of Europe, including nutritional rosette of peach [ibid., xxv, p. 265] and the withering of olives observed in Italy and Spain [ibid., xviii, p. 537; xxv, p. 172].

Blodgett (E. C.). **Transmission of Peach wart by graft inoculations with affected fruit tissue.**—*Phytopathology*, xxxvi, 8, p. 675, 1946.

In August, 1942, three J. H. Hale and three Elberta peach trees at Moscow, Idaho, were inoculated by inserting three wedges of fruit tissue affected with the peach wart virus [*R.A.M.*, xxv, p. 566] into the bark of each trunk [cf. ibid., xxiv, p. 155]. Examination in August, 1945, showed that all the trees inoculated by this method and by bud transmission were the only ones showing warty fruit in plots containing several hundred. The fruit symptoms were typical and severe [ibid., xxii, p. 213]. No control inoculations with healthy tissue were made.

Cochran (L. C.). **Passage of the ring spot virus through Mazzard Cherry seeds.**—*Science*, civ, 2699, pp. 269–270, 1946.

When buds from unbudded Mazzard cherry seedlings with leaves showing ring spot and mottled patterns [cf. *R.A.M.*, xxiv, p. 236] were inserted into peach trees, typical ring spot symptoms developed. This suggested seed passage of the virus. In 1943 seed was obtained from four sources, (*a*) mixed commercial Mazzard seed, (*b*) seed of Stark's Gold (a large-fruited yellow Mazzard) with no evidence of ring spot, (*c*) Mahaleb [*Prunus mahaleb*] seed from a tree experimentally infected with ring spot and which had shown characteristic symptoms for two years, and (*d*) seed from an apparently virus-free Mahaleb cherry. All the seeds were stored for 100 days in moist peat at 36° to 40° F. They were planted in ground beds in a lath house in April, 1944. By 1st June, of 467 seedlings of lot (*a*) 25 showed ring spot. No evidence of the disease was seen in seedlings of the other three lots and none appeared during the next year.

In October, 1944, two buds from each of six of the affected Mazzard seedlings were inserted in each of two Hale peach nursery trees. A parallel series was prepared with buds from apparently healthy seedlings of lot (*a*). In April, 1945, seven of the 12 inoculated peaches, representing five of the six symptom-bearing Mazzards, showed typical ring spot. None in the parallel series developed ring spot.

The evidence, therefore, indicates that the ring spot virus can invade and be carried in Mazzard cherry seeds.

Gherson (L.). **A disease of Fragaria caused by Fusarium orthoceras.**—*Palest. J. Bot.*, J. Ser., iii, 1, pp. 54–55, 1945.

In 1941 strawberry plants in a Jerusalem garden withered after rooting normally, and from white spots on the dried roots *Fusarium orthoceras* was isolated. Inoculations of the soil with suspensions of the isolate, or of the roots through wounds, induced the characteristic symptoms and the plants died in 70 days. The fungus was successfully reisolated. In culture it exhibited great morphological variability. The optimum temperature for growth was 24° C.; at 4° growth was checked and a temperature of 37° was lethal. The mycelium altered its colour according to the hydrogen-ion concentration of the medium, being ruby to yellow in acid media and dark blue-grey in basic.

Venkatakrishnaiya (N. S.). **Perfect stage of Sclerotium rolfsii Sacc. causing pseudo stem-rot of Plantain (Musa sapientum).**—*Curr. Sci.*, xv, 9, p. 259, 2 figs., 1946.

Plantains of the Rasabale variety in Mysore, Bangalore, and Tunkur Districts, Mysore State, are subject to a rot caused by *Sclerotium rolfsii*, which was cultured from diseased garden fruits in August, 1935, and produced basidiospores on onion-asparagin agar in 40 days [cf. *R.A.M.*, xviii, p. 233]. Both test-tube and Petri-dish cultures, grown at 17·9° to 29·1° C. and stored for 40 to 60 days, developed a dense, white hymenium in July, 1936. The clavate, hyaline basidia, closely aggregated into crusts, measure 6 to 12 by 4 to 6 $\mu$ (average of 14, 9 by 4·5 $\mu$) and bear two to four sterigmata, 4 $\mu$ in length; the smooth, hyaline, ovate basidiospores are 3 to 4 by 2 to 3 $\mu$. The perfect state of the fungus had previously been produced by Mundkur in India from cotton, betel vine [*Piper betle*], potato, and sugar-cane, and provisionally designated *Corticium rolfsii* Curzi [ibid., xiv, p. 125; and cf. xxii, p. 154.] The dimensions of the plantain strain and the appearance of the hymenial crust agree sufficiently well with the foregoing to identify it as the same species.

Sen (P. K.), Ganguly (B. D.), & Mallik (P. C.). **A note on a leaf-curl disease of the Papaya (Carica papaya Linn.).**—*Indian J. Hort.*, iii, 1, pp. 38–40, 2 pl., 1946.

Papaw trees in Bihar are affected by a serious disease causing, successively, foliar etiolation and curl, distortion of the leaves and fruits, and premature death. A similar trouble has been reported from Australia [under the name of 'yellow crinkle': *R.A.M.*, xvii, p. 259] and Hawaii [ibid., xviii, p. 693], in both of which a virus is suspected [cf. also ibid., xxii, p. 319]. Experiments conducted at the Horticultural Research Station, Sabour, to determine the nature of the disease, showed that the leaf-curl symptoms could be induced in actively growing, sound plants of the Ranchi variety by inoculation with the juice from diseased specimens; that the disease is not seed-borne; and that it can be initiated by waterlogging of the soil, independent of inoculation. Further investigations are proceeding.

Barratt (R. W.). **A laboratory assay for stability of organic fungicide residues.**—Abs. in *Phytopathology*, xxxvi, 8, p. 679, 1946.

A technique is described for measuring the following factors causing failure of fungicides in the field: tenacity, previous material in the spray tank or additives, decomposition during application, and of the spray residue by ultra-violet light, leaf exudates, atmospheric gases, rain water, and soil on leaves. Two sets of coated glass slides are sprayed in a dosage series employing a dose ratio of 2 or $\sqrt{2}$, one set being assayed immediately for fungicidal potency. The remaining slides are stored at a constant temperature in a closed chamber, having the environment being studied. By assaying slides stored for different periods the $LD_{90}$ values in terms of microgm. per sq. in. can be determined. Studies of the rate of decomposition of disodium ethylene bisdithiocarbamate [commonly known as dithane] in the presence of water and oxygen have been made in this way, the rate being slowed down by adding zinc sulphate and lime.

Horsfall (J. G.), Barratt (R. W.), & Gries (A.). **Distinguishing permeation from toxicity of fungicides.**—Abs. in *Phytopathology*, xxxvi, 8, p. 680, 1946.

Penetration of a chemical into a cell is not usually distinguished in toxicity data from damage to the cell contents. Sodium sulphate and other monovalent electrolytes which increase the permeability of cells have been found to increase the potency of disodium ethylene bisdithiocarbamate [dithane] and *o*-quinone dioxime

to *Macrosporium* [*Stemphylium*] *sarciniforme*. That this is due to increased permeability and not to enhanced toxicity is demonstrated by the fact that the effect can be counteracted by calcium and other divalent electrolytes which reduce the permeability effects of sodium salts. If the toxicant is held constant and sodium sulphate is increased, potency increases and diminishes periodically, but these variations can be rectified by concomitant variation of the amount of calcium. If the effect is due to variations in permeation through a colloidal gel, in this case the cell wall of the spore, the periodic characteristic resembles the phenomenon in Liesegang rings. Zinc sulphate can synergize disodium ethylene bisdithiocarbamate by liberating sodium sulphate into the medium which causes the toxicity to rise until all the sodium has been displaced. Apparently the increased permeation more than counterbalances the reduced toxicity of the zinc salt. Calcium in the mixture neutralizes much of the effect.

Horsfall (J. G.), Turner (N.), & McDonnell (A. D.). **Inter-actions of concentration, pressure, time, and orifice in spraying.**—Abs. in *Phytopathology*, xxxvi, 8, p. 680, 1946.

The interactions of various factors in spraying were studied by varying the amounts of material applied per acre, using Bordeaux mixture on potatoes or calcium arsenate on beans [*Phaseolus vulgaris*]. The rate of deposit increased most with concentration and less with time, pressure, and orifice diameter in that order. Deposit increased more rapidly with short than with long spray time, with low than with high pressure, and with small than with large orifices. Using a constant concentration, calcium arsenate deposited best on potatoes with high pressure, short time, and small orifices. Deposits may, however, have different tenacity and coverage according to the technique employed. The larger the deposit of calcium arsenate, the faster it was washed off by the rain. Applications with short spray times, therefore, washed off more rapidly than those from longer ones, which tended to nullify the advantage of original deposition. An assay of coverage was attempted, using the log-probit dosage-response curve with Bordeaux mixture and leafburn on potato. The laboratory conclusion that good coverage should be shown by a steep slope was not confirmed; a strong concave curvature resulted, presumably attributable to the more rapid washing-off of larger deposits.

Raucourt (M.) & Bégué (H.). **Revue de phytopharmacie. VI.** [Review of phytopharmacy. VI.]—*Ann. agron.*, iii, pp. 451–486, 1942. [Abs. in *Rev. Bot. appl.*, xxiii, 257–259, p. 66, 1943. Received October, 1946.]

In this paper of the present series [cf. *R.A.M.*, xxv, p. 461] the authors deal with physical methods used to study the fineness of dusts employed for purposes of plant-disease control [ibid., xxv, p. 433], copper salts, tar oils, fumigation gases, insecticides derived from plants, and miscellaneous fungicides.

Chadefaud (M.). **Biologie des champignons.** [The biology of fungi.]—267 pp., 50 figs., Paris, Librairie Gallimard (Collection L'Avenir de la Science), 1944. [Received November, 1946.]

In this book the author has confined himself mainly to a study of the reproductive organs and sexual cycles of fungi [Eumycetes], with a discussion of their origin and phylogeny. He does not share the generally accepted views on some aspects of these matters, but expresses a personal opinion on a number of points, including the morphological value of the mycelial structures, the phylogenetic independence of the Phycomycetes on the one hand and the rest of the Eumycetes on the other, the theory of the Floridean origin of the latter, and the reversion to the name Mycetozoa with the relegation of this group to the Protozoa.

Wilkins (W. H.) & Harris (G. C. M.). **The ecology of the larger fungi. V. An investigation into the influence of rainfall and temperature on the seasonal production of fungi in a Beechwood and a Pinewood.**—*Ann. appl. Biol.*, xxxiii, 2, pp. 179–188, 8 graphs, 1946.

In continuation of the study of the ecology of the larger fungi [*R.A.M.*, xix, p. 421] the authors present a survey, covering the year 1936, of the seasonal distribution of larger fungi in a pine wood and a beech wood in Berkshire, correlating the numbers and species found with the temperature, rainfall, moisture content of the substratum, and the effect of the canopy. They conclude that as for grasslands the water content of the substratum and temperature are the principal factors governing sporophore production. For the beech wood it is estimated that the water content should be above 50 per cent. and the arithmetic mean of minimum temperatures above 4° C. There is, however, a lag phase between the onset of favourable conditions and sporophore production, which is shorter for species with small fructifications and longer for the larger ones. The effect of the canopy is to reduce the amount of rain reaching the substratum, but this is more than offset by the reduction of temperature extremes, thus making a wood a more favourable habitat than open country for the fungi and contributing to a longer season.

Gott (Cora L. T.) & Goldsmith (G. W.). **A method for the macroscopic study of root diseases.**—*Phytopathology*, xxxvi, 8, pp. 667–670, 1 fig., 2 graphs, 1946.

A modification of Pirone's method for the commercial propagation of plants without the use of soil or of any type of solid medium (*Science*, xciv, p. 74, 1941) is described. Germinating cotton and maize seedlings were held between a vertical sheet of glass and filter paper. The paper folds over into a pan of nutrient solution maintained at a constant level from a reservoir. The growth of the roots could thus be followed. The cotton seedlings grown in this way were killed after inoculation with *Phymatotrichum omnivorum*. Maize, which is immune from *P. omnivorum* in the field, became susceptible to attack, but was not killed. Withholding magnesium from the nutrient solution, however, rendered the maize seedlings susceptible to lethal attack by *P. omnivorum*.

Gaümann (E.). **Types of defensive reactions in plants.**—*Phytopathology*, xxxvi, 8, pp. 624–633, 5 figs., 1946.

This paper describes shortly, with a consistent terminology, the six types of defensive reaction of plants to pathogens discussed in detail in the author's book, 'Pflanzliche Infektionslehre' [*R.A.M.*, xxv, p. 173], namely, (1) the plasmatic anti-infection reactions, which operate (*a*) by altering and weakening the invading parasite, (*b*) by localizing the intruding pathogen, and (*c*) by digesting and eliminating the intracellular parasites; (2) the necrotic reactions caused by hypersensitiveness of the host cells; (3) premunity [ibid., xxiii, p. 139], based upon an alteration of the host effect by pre-infection, through which the host has gained a power of resistance not originally possessed; (4) histogenic demarcations aimed at localizing the disease focus; (5) gummous demarcations; and (6) induced tolerance.

Snyder (W. C.) & Hansen (H. N.). **Control of culture mites by cigarette paper barriers.**—*Mycologia*, xxxviii, 4, pp. 455–462, 2 figs., 1946.

A description is given of a method of controlling mites that infect cultures which has given satisfactory results for over six years. After a culture has been made, the cotton plug is pushed below the rim, which is then flamed. The tube is held upside down and the flamed rim pressed gently with a rotary motion against the surface of solidified gelatine (20 per cent. with 2 per cent. copper sulphate added) until it is coated with a thin film of gelatine. The rim is then placed against cigarette papers (cut in half and sterilized in a Petri dish) so that the top sheet

adheres to it. It is made to adhere tightly by pressing it firmly against a blotter. The tube is next placed upright in a rack with others similarly prepared, all being so arranged that the corners of the projecting pieces of paper touch. When ignited at a single point, the projecting paper on all the tubes will burn off, leaving neat, circular paper seals that effectively keep out all contaminants. When subcultures are required, the seal is burned off by flaming, and after the transfer is complete the tube may be re-sealed.

This paper barrier is so effective that cotton plugs need be used only until the medium is seeded. Of many brands of cigarette paper tested the only ones found satisfactory were white cigarette papers of the L.L.F. (Riz La Croix), Tip Top, OCB, and Black Sea brands, and of these L.L.F. was the most suitable, because it left the least ash.

Smith (G.). **Recent progress in industrial mycology.**—*Sci. Progr.*, xxxiv, 136, pp. 670–680, 1946.

The author succinctly reviews the known methods for preventing mould growth, e.g., improved packing, use of mould-resistant and mould-proofed materials, and antiseptics for the protection of textiles and other materials subject to moulding. He then turns to the uses of moulds, and deals with penicillin and other antibiotics. The paper concludes with a brief survey of recent publications on the taxonomy of moulds, reference being made to the present lack of trained taxonomists in Britain.

Herrell (W. E.). **Penicillin and other antibiotic agents.**—xv+363 pp., 32 figs., 13 graphs, Philadelphia and London, W. B. Saunders & Co., 1945. 25*s*.

This comprehensive treatise deals mainly with results of experimental and clinical studies on the uses of penicillin in particular and other antibiotics in general. The first part surveys the development of penicillin, methods of preparation, properties, anti-bacterial activity *in vitro* and *in vivo*, its physiological behaviour in the living body, methods of standardization, and its detection in body fluids. The second and third parts are concerned with the clinical use of penicillin. Part four treats in a similar manner tyrothricin (gramicidin and tyrocidine), streptothricin, and streptomycin and summarizes the knowledge to date of other known antibiotics, including actinomycin, penicillic acid, gliotoxin, claviformin (clavicin and patulin), flavicin, and flavicidin. Each chapter ends with a full bibliography.

Chandler (Velma L.) & Shaw (R. D.). **Dropping device for cylinder plate assay of penicillin.**—*Science*, civ, 2699, 1 fig., 1946.

A description is given of a mechanism devised by R. D. Shaw for use in the cup-plate method of assay of the potency of antibiotics. It sets four or six sterile cylinders simultaneously on the agar surface at evenly spaced distances and from exactly the same height. With this apparatus an average of 10 plates per minute can be cupped.

Johns (M. E.), Philpot (Flora J.), & Pollock (A. V.). **Moulds producing penicillin-like antibiotics.**—*Nature, Lond.*, clviii, 4013, p. 446, 1946.

Antibiotics resembling penicillin have been shown to be produced by the following species of *Penicillium*: *P. steckii* [*R.A.M.*, xxii, p. 13], *P. chloroleucon* [ibid., xxiv, p. 242], *P. asperulum*, *P. crateriforme*, and *P. griseo-fulvum* [loc. cit.].

Brian (P. W.), Curtis (P. J.), Hemming (H. G.), & McGowan (J. C.). **The production of viridin by pigment-forming strains of Trichoderma viride.**—*Ann. appl. Biol.*, xxxiii, 2, pp. 190–200, 6 graphs, 1946.

The authors present extended studies [*R.A.M.*, xxiv, p. 427] on the production, properties, and highly fungistatic activity of viridin, derived from yellow strains of *Trichoderma viride*.

In emphasizing the importance of the depth of the medium in determining the fungistatic activity of culture filtrates, it is pointed out that there is an optimum depth varying with the strain used and that on shallow layers (0·5 cm.) a peak of activity is usually reached about the sixth day of incubation at 25° C., followed by a rapid decline.

The striking specificity of viridin was demonstrated by the inhibition of the conidial germination of *Botrytis allii* at 0·006 μg. per ml., whereas 6·25 μg. per ml. was required to prevent it in the case of *Penicillium expansum*. Concentrations above 50 μg. per ml. were needed to kill conidia of *T. viride* and for *B. allii* one a thousand times greater than the minimum required to inhibit germination was necessary to destroy the spores entirely in two hours. A distinctive characteristic of viridin is that, alone among antibiotic mould products so far described, it exercises little or no bactericidal effect.

Acidity is essential to stability of viridin in aqueous solutions; at pH 2·9 half the activity remains after 14 days at 25°, but at pH 5·8 all activity is lost in a day, and at pH 8·4 it ceases immediately. Aqueous solutions are inactivated by peptone and yeast extract, and by several pure chemical compounds likely to be present in such materials.

Wilkins (W. H.). **Investigations into the production of bacteriostatic substances by fungi. Preliminary examination of more of the larger Basidiomycetes and some of the larger Ascomycetes.**—*Ann. appl. Biol.*, xxxiii, 2, pp. 188–190, 1946.

The results of testing sporophore extracts of 65 species of Basidiomycetes and 34 species of Ascomycetes [*R.A.M.*, xxiv, p. 158] for their antibiotic properties against *Bacterium coli* and *Staphylococcus aureus* are recorded in this paper, 28 of the 99 fungi yielding extracts active against one or both of the pathogens.

Atkinson (Nancy). **Antibacterial activity in members of the higher fungi 1. Cortinarius rotundisporus and Psalliota xanthoderma Genev.**—*Aust. J. exp. Biol. med. Sci.*, xxiv, 3, pp. 169–173, 1946.

Anti-bacterial activity against a wide range of bacteria, including the Gram-positive *Staphylococcus aureus*, the Gram-negative *Bacterium typhosum*, and the acid-fast *Mycobacterium phlei* and the vole type of tubercle bacillus, was exerted by aqueous extracts of *Psalliota xanthoderma* and *Cortinarius rotundisporus* collected in various parts of South Australia [*R.A.M.*, xxv, p. 308]. The antibiotic substance was probably different in each fungus, since the two extracts did not behave uniformly. In neither extract was activity impaired by the presence of 10 per cent. serum. The toxicity of crude preparations to mice was of a low grade.

Bose (S. R.). **Hereditary (seed-borne) symbiosis in Casuarina equisetifolia Forst.**—Abs. in *Proc. Indian Sci. Congr.*, xxxi, Part III, pp. 62–63, 1944. [Received 1946.]

The symbiotic fungus previously reported in *Casuarina equisetifolia* [*R.A.M.*, xxiii, p. 352] has been provisionally identified as *Phoma casuarinae* Tassi. It occurs in the pericarp wing of the fruits and in the seed coats, infecting the emerging radicles, and its quinqueseptate hyphae can be discerned among the dense rows of root hairs when the seeds are germinated on moist filter paper in Petri dishes. Roots of a cutting from an infected plant bore the typical hyphae of the fungus both externally and internally, and the mycelium was also present in all the other organs of the host except the endosperm and the embryo. Thus, every *C. equisetifolia* plant is a dual organism, harbouring a fungus in its seeds, so that the symbiotic relationship becomes hereditary.

Sporadic formation of ectotrophic mycorrhiza has been experimentally induced in the roots of a number of seedlings, which in the course of three to four months

developed bunches of coralloid roots. An examination of the fruits of seven other *C.* spp. from Australia invariably disclosed the presence of coils of septate hyphae in their pericarp wings.

Manns (T. F.). **What is net necrosis of Potato?**—Abs. in *Phytopathology*, xxxvi, 8, pp. 686–687, 1946.

The results of a spraying experiment, in which DDT, with or without calcium arsenate, was used to control leafhoppers on potatoes, showed that net necrosis developed rapidly in store in the tubers of unsprayed plants. In addition no leaf roll developed on plants affected with net necrosis although pathologists tend to associate the two diseases [*R.A.M.*, xviii, p. 788]. The author concludes that this evidence, coupled with observations covering 35 years that severe net necrosis always occurs during seasons of much leafhopper injury, indicates that net necrosis is leafhopper injury.

McDonald (J.). **Annual report of the Department of Agriculture, Cyprus, for the year 1945.**—8 pp., 1946.

On p. 7 of this report [cf. *R.A.M.*, xix, p. 198] it is stated that during 1945 the potato crop grown in Cyprus from imported Arran Banner seed was considerably affected by 'sprain' [spraing: ibid., xxiii, p. 89; xxiv, p. 385]. The disease did not appear to be contagious, and no specific organism was isolated from affected material. The Up-to-Date variety was unaffected, and all crops grown from home-produced seed remained healthy.

Bawden (F. C.) & Kassanis (B.). **Varietal differences in susceptibility to Potato virus Y.**—*Ann. appl. Biol.*, xxxiii, 1, pp. 46–50, 1946.

Individual potato varieties differ not only in their symptomatological response to infection with potato virus Y, but also in their susceptibility to infection, in the virus concentration developed in their sap, and as sources of virus for aphids. The writers' experiments both in the field and under glass confirm previous observations of commercial crops [*R.A.M.*, xviii, p. 813; xix, p. 671; xxii, p. 222] and demonstrate the differences in the readiness with which varieties absorb the infective principle and in the virus content each develops. As response to the disease in the field is closely related to the degree of susceptibility, it is held that relative varietal field behaviour may be reliably predicted by the results of transmission tests with aphids.

In small-scale field trials at Rothamsted in 1942 and 1943, and at the Midland Agricultural College, Sutton Bonington, in 1942, where healthy plants surrounded infected ones, one with leaf roll and another with virus Y, although there was a wider incidence of virus infection at Rothamsted than at Sutton Bonington, in all three tests the relative susceptibility of the varieties was the same. Arran Banner and Majestic proved most resistant, with 45 per cent. infection, and Arran Pilot and May Queen most susceptible with 90 per cent. Some varieties became infected mainly with virus Y (Arran Pilot) while others had more leaf roll (Arran Consul). Katahdin exhibited remarkable resistance which was observed also in glasshouse inoculation experiments, while the British varieties all showed systemic infection and the only differences observed were in the type of symptoms induced. Inoculation of healthy tobacco and potato plants with dilute virus Y-infected tobacco sap produced 100 per cent. infection in the former but not in the potato varieties. More infections occurred in Arran Pilot and May Queen, which develop mosaic symptoms, than in Arran Consul and Gladstone, which react with local lesions and systemic necrosis.

In transmission experiments with aphids (*Myzus persicae*) Katahdin again proved to be resistant to virus Y and Ulster Monarch nearly as susceptible as tobacco.

Most of the common British varieties gave an intermediate response in their reaction, Majestic, Arran Banner, Redskin, Sharpe's Express, Gladstone, and Kerr's Pink showing a 15 to 30 per cent. range of infection and Arran Pilot, King Edward, and May Queen from 50 to 60.

Aphids which had fed on infected tobacco or different potato varieties were transferred to healthy tobacco seedlings. The aphids were shown to become more viruliferous after feeding on tobacco than on potato and, except in the case of the May Queen variety in the first year of infection, the percentage of healthy tobacco plants infected corresponded closely to the precipitin titres of the source plants. Sap from Majestic with a virus content of 0·25 infected only 8 per cent., while that from Arran Banner with a content of 5 infected 55 per cent. of the tobacco plants; thus, sap of the more resistant variety proved more virulent to tobacco than that of the more susceptible. Therefore, the multiplication of the virus once established in a plant is not necessarily correlated with liability to infection. The different reactions of British varieties when exposed to the same conditions are sufficiently great to be of economic importance and they explain why once-grown seed of Arran Banner usually yields well, while Arran Pilot seed produced under the same conditions does not.

The results of these small-scale field trials suggest that tests can be made early in the life of seedlings provided that they are set up in districts where leaf roll and potato virus Y spread fairly rapidly. It is considered that Katahdin might react differently to other strains of virus Y, of which only one source was used in the course of these experiments.

Alabouvette (L.). **Le mildiou de la Pomme de terre.** [Potato late blight.]—*Progr. agric. vitic.*, cxxv, 22–23, pp. 364–368, 1946.

The author gives a succinct account in semi-popular terms of potato late blight (*Phytophthora infestans*), with special reference to French conditions [cf. *R.A.M.*, xviii, p. 814; xxv, p. 469], the points dealt with including the symptoms, the biology of the fungus, the effect of meteorological factors on the disease, resistance, resistant varieties, and control. In Brittany, sporangia are found in February on discarded potatoes left near the storage places.

Störmer [Inge] & Ebell (Marie). **Rhizoctonia-Bekämpfungs-Versuche.** [*Rhizoctonia* control experiments.]—*Mitt. Landw., Berl.*, lix, 16, pp. 352–353, 1944.

*Rhizoctonia* [*Corticium solani*] is steadily gaining ground in Germany and now occupies the first place, at any rate in the north-east, as a parasite of potatoes [*R.A.M.*, xxiii, p. 405]. With the extension of the crop to cover an area of 25 to 33 per cent. of the total under cultivation, a cumulative increase in the amount of soil inoculum produced by the saprophytic phase in the life-cycle of the fungus is to be expected.

In 1936 experiments were carried out at Dramburg, Pomerania, in collaboration with [H.] Braun, of the Biological Institute, Dahlem, Berlin, to determine the influence on the course of the disease of (1) planting time, (2) planting depth, and (3) adhesion of the sclerotia to the tubers. The varieties used were Herulia and Merkur, both supplied by the Pomeranian Seed Association. The difference in the incidence of infection between the two planting dates (5th and 20th May) was inconsiderable, barely exceeding the margin of error; the numbers of severely diseased sprouts were 288·7 and 268·7, respectively. The general recommendation of shallow planting for potato tubers proved to be well founded in these trials, in which 339 sprouts were attacked in the deeply planted plots (15 cm.) compared with 218·4 in the shallow (5 cm.). Tubers encrusted with sclerotia gave rise to 370·9 severely infected shoots as against 186·5 in the plots planted with sclerotia-

free material. Promising results in the elimination of these organs were given by soil disinfection with the preparation 'P' (I. G. Farben), as reported in *Nachr. SchädlBekämpf., Leverkusen*, 2, 1939 [cf. also *R.A.M.*, xvii, p. 545]. In connexion with late planting, the authors draw attention to the risk from aphid-borne viruses which may well outweigh the benefit of a reduction in the incidence of *C. solani*.

Appel. **Auflaufkrankheiten der Kartoffel und ihre Verhütung.** [Emergence diseases of the Potato and their prevention.]—*Mitt. Landw., Berl.*, lix, 17, pp. 383–384, 1944.

No convincing explanation appears to be forthcoming of two pathological conditions reducing the emergence of potato tubers in Germany, one characterized by the production of slender, sickly 'threads' in place of normal sprouts and the other by the development of a number of under-sized tubers from the eyes. Gaps in the stand may also be due to exceptionally severe involvement of the tubers by scab [*Actinomyces scabies*] or *Phytophthora* [*infestans*]. *Rhizoctonia* [*Corticium solani*: see preceding abstract], in addition to its attacks on the growing crop, is also an agent of heavy damage to the emerging sprouts, killing them in succession as they are produced from the reserve 'eyes' of the tuber until complete exhaustion ensues.

Small (T.). **Dry rot of Potato (Fusarium caeruleum (Lib.) Sacc.). Effect of planting infected and contaminated sets on plant establishment.**—*Ann. appl. Biol.*, xxxiii, 2, pp. 219–221, 1946.

In experiments from 1942 to 1945 with the Ninetyfold, Majestic, and Doon Star varieties of potato, healthy whole sets inoculated with *Fusarium caeruleum* [*R.A.M.*, xxiv, p. 201] internally three days before planting gave good stands, whereas whole sets with obvious dry rot lesions yielded stands with gaps. Healthy cut sets produced satisfactory stands except in one test with Doon Star, while those cut with a contaminated knife at planting time gave only a few misses in 1943 but many in the unfavourable season of 1944 and in 1945.

Thomas (D. G.). **Powdery mildew of Potato.**—*Nature, Lond.*, clviii, 4012, pp. 417–418, 1946.

Potato powdery mildew (? *Erysiphe cichoracearum*) [*R.A.M.*, xiii, p. 681; xxiii, p. 253; xxiv, p. 471] was again observed at Cambridge in the late summer of 1945, on seedling plants in the greenhouse and on potatoes in trial plots in the open. It was found to be prevalent throughout the whole of the area within a ten-mile radius of the town and the heaviest attacks were in the south-west of the county. It was not observed on the varieties Kerr's Pink, Gladstone, and Red Skin, or on any solanaceous plant other than potato. Inoculation tests on plants related to the potato and on species known to be susceptible to *E. cichoracearum* gave positive results only with White Burley tobacco. In the greenhouse and trial plots the mycelium was more abundant on the upper surface of the leaves, while in the field the lower surface was that usually attacked. Round to oval patches about 1 to 3 cm. in diameter developed, and sometimes coalesced. No infection of the petioles or stems was observed [cf. ibid., xv, p. 604]. The subglobose to ovate haustoria, which formed in the epidermal cells, measured approximately 41·5 by 27·5 $\mu$, and the mean dimensions of the conidia were 29·6 by 16·8 $\mu$. No perithecia were observed. No reports of a powdery mildew on potatoes have been recorded from any part of Great Britain except Cambridge.

Venkatakrishnaiya (N. S.). **Ephelis on two new hosts.**—*Curr. Sci.*, xv, 9, pp. 260–261, 2 figs., 1946.

*Ephelis oryzae*, a common pathogen of rice in several parts of India [*R.A.M.*, xvii, p. 295; xxiv, p. 472], was observed in 1943–4 in the vicinity of diseased crops

on two grasses, *Isachne elegans* and *Eragrostis tenuifolia*, the former at Nagenhally, Mysore, and the latter at Hebbal, Bangalore. The infected plants were stunted, with a silvery-greyish lustre on the blades, and the normally loose panicles, 3 to 6 in. long, were reduced to black spikes, 1½ to 2½ in. long. The mycelium forms a dirty grey, later black, sclerotioid mass, enveloping the florets and spikelets and uniting them with the main rachis. The acicular, hyaline, vacuolate conidia, 16 to 28 by 1·3 to 2 $\mu$, form a gelatinous matrix on detachment from the conidiophores. These dimensions agree with those of the rice strain of the fungus (17 to 28 by 1·7 $\mu$), to which the grass parasite is accordingly referred pending further observations on its perfect state *Balansia oryzae* (Syd.) Narasimhan and Thirumalachar (*Curr. Sci.*, xii, p. 276, 1943).

Bocquet. **État actuel des plantations d'Hévéa en Indochine.** [The present condition of the Rubber plantations in Indo-China.]—*Rev. Bot. appl.*, xxii, 247–248, pp. 180–190, 1942. [Received October, 1946.]

In this paper (composed of extracts from an article on the condition of the rubber plantations in Indo-China during 1940 which appeared in *Rev. gén. Caoutch.*, xviii, 170, pp. 327–332, 1941) it is stated that the most important diseases found in this region are *Corticium* [*salmonicolor*], stripe canker [? *Phytophthora palmivora*: cf. *R.A.M.*, xxiii, p. 290], and 'patch' canker [? *Pythium complectens*: cf. ibid., xx, p. 321]. *C. salmonicolor* attacks the trees during their second or third year of cultivation, and reaches its full development towards the fifth or sixth year, when many plantations show 100 per cent. infection. Stripe canker develops when the first rains fall, in June or July, but its worst effects are experienced between October and December. 'Patch canker', or what is called by that name locally, though it appears to differ somewhat from the form of the disease found elsewhere, has appeared in the last two or three years [before writing] on the tapping panels of certain grafted varieties, particularly B.D. 5. In some plantations up to 50 per cent. of the trees are affected. It is considered that this disease may be a more serious form of stripe canker which affects clones with a susceptible bark.

Langford (M. H.). **Regional differences in resistance of Hevea selections to South American leaf blight.**—Abs. in *Phytopathology*, xxxvi, 8, p. 686, 1946.

Tests with a varied collection of *Hevea* rubber seedlings and clones against South American leaf blight (*Dothidella* [*Melanopsammopsis*] *ulei*) [*R.A.M.*, xxv, p. 72] in widely scattered tropical American nurseries during the past five years have shown the sensitivity of the fungus to weather conditions. This, together with the regional variation in disease severity, has necessitated thorough resistance tests in several localities for reliable selection work. Groups of clones from several widely separated areas in the natural habitat have been grown under comparable exposure to blight in regional test plots in Costa Rica, Panama, Trinidad, Brazil, and Peru. Also, numerous seedlings from jungle trees have been tested at their place of origin and elsewhere. Clones and seedlings, highly susceptible in some areas, have been unaffected or only slightly damaged in some others. Prolonged exposure, however, has disclosed many cases of increased disease incidence as variants of the fungus were encountered. Some clones which have proved sturdily resistant in all areas are now recommended for commercial use.

Rands (R. D.). **Progress on tropical American Rubber planting through disease control.**—Abs. in *Phytopathology*, xxxvi, 8, p. 688, 1946.

Reference is made to the co-operative research on tropical rubber-planting conducted since 1940 by the United States Department of Agriculture and to technical

guidance furnished to 13 tropical American Republics interested in rubber-planting, including the control of leaf blight (*Dothidella* [*Melanopsammopsis*] *ulei*) by Langford's spraying methods [*R.A.M.*, xxiii, p. 455] and crown-budding with resistant Ford selections [ibid., xxv, p. 71].

The development of commercial planting has progressed so that by 1944 more than 28,000 acres of high-yielding rubber had been established. The value of permanent, self-sustaining, small-farm, or single-family type of rubber production is emphasized. The planting of crown-budded oriental clones has been accompanied by a co-operative breeding programme [see preceding abstract] which has supplied thousands of $F_1$ and $F_2$ hybrids, some of them likely to combine high yield with blight resistance.

Presley (J. T.). **Diplodia die-back of Guayule (Parthenium argentatum Gray).**—*Phytopathology*, xxxvi, 7, pp. 565–571, 2 figs., 1946.

Two-year-old irrigated guayule (*Parthenium argentatum*) in south Texas suffered severely from die-back due to *Diplodia* [*Botryodiplodia*] *theobromae* during the late summer and early autumn of 1945. Infection usually originates in the leaves or twigs and proceeds downwards. In the field the first foliar symptoms are irregular, necrotic, rapidly coalescent lesions, leading to the death of the leaf, with conspicuous yellowing after half the blade has been killed. From the twigs the fungus passes downwards to the larger branches, girdling and killing them, while the foliage turns yellow. Infections near soil-level cause the girdling and collapse of the whole plant. Under humid conditions the black pycnidia of the fungus are produced beneath the dead bark and erupt as elongated, carbonaceous masses.

Small seedlings grown in soil sprayed with a spore suspension of *B. theobromae* commonly succumbed to the pathogen, especially at 80° F. Leaf and twig infections in the greenhouse were successful only when the humidity was maintained at a high level for 24 hours and upwards and temperatures ranged from 80° to 90° F. Old plants with hardened dry leaves were more susceptible than young, succulent plants with green, active foliage.

Stiles (W.). **Trace elements in plants and animals.**—xi+189 pp., 12 figs., Cambridge, University Press, 1946. 4*s.* 6*d.*

Included in this useful manual on the relation of the trace elements to health and disease in plants and animals are an historical introduction to the subject and chapters dealing with methods of investigating micro-nutrient problems, trace-element deficiency diseases of plants, and the functions of trace elements in plants. A 22-page bibliography is appended.

Dutta (S.) & Chaudhuri (H.). **Fungus flora of the soil and reduction of carbohydrates by them.**—Abs. in *Proc. Indian Sci. Congr.*, xxxi, Part III, p. 62, 1944. [Received 1946.]

A gradual increase in the species and numbers of the mycoflora from unreclaimed to reclaimed soils was registered in an ecological survey of the Lahore district [*R.A.M.*, xvi, p. 773]. Soils from sewage farms were richer in fungi than those of rice fields [ibid., xix, p. 302] under irrigation, though after the harvesting of the crop the incidence generally rose. The genus *Aspergillus* predominated both in species and numbers, followed by *Penicillium*. Mucorales were absent from the unreclaimed soils owing to the lack of organic matter, but were well represented on the sewage farms. Members of this group were the most active reducers of starch. The development of soil fungi is promoted by an abundance of organic nutriment and a slightly acid reaction, and is more copious in the winter than during the summer months [cf. ibid., xiv, pp. 121, 140, *et passim*].

McM[ARTIN] (A.). **Report on mosaic disease survey.**—*S. Afr. Sug. J.*, xxx, 6, p. 311, 1946.

The position as regards sugar-cane mosaic in Natal [*R.A.M.*, xxv, p. 279 and next abstract] at the time of writing was as follows. On the south coast a severe focus of infection at Umzinto was spreading inwards; farther south a much smaller outbreak was observed at Port Shipstone, and between the two areas odd cases of the disease were encountered. On the north coast mosaic has been found in the Umdhloti Valley region and near Verulam, and the inspectors have reported infected stools in sections hitherto free from the disease. A similar situation exists at Tongaat. The importance of eradication of infected stools and of planting exclusively selected, healthy cane is strongly urged, and all cases of suspected infection should be submitted to the Mount Edgecombe Experiment Station for expert examination.

McMARTIN (A.). **Agricultural systems and the health of crops.**—*S. Afr. Sug. J.*, xxx, 7, pp. 327, 329, 331, 1946.

This is an abridgement of the author's Presidential Address to Section C of the South African Association for the Advancement of Science at the 44th annual meeting in Pretoria, July, 1946. The relationship between the various cropping systems—rotation, fallow, and monoculture—and plant health is examined and discussed with special reference to its bearing on the cultivation of sugar-cane in Natal. Among the new problems confronting the plant pathologist in this province is the extension of the area under fodder grasses, notably *Setaria* spp., to meet the needs of the developing dairying, cattle-fattening, and pig-rearing industries. Symptoms identical with those of sugar-cane mosaic [see preceding abstract] have recently been observed on *S. splendida*, which may therefore serve as a source of infection by the virus. Other aspects of the subject reviewed are crop nutrition and mineral fertilizers in connexion with disease.

ABBOTT (E. V.). **Sugar Cane disease situation in Louisiana.**—*Sug. Bull., N.O., 1946*, 1st June, pp. 129–130, 1946. [Abs. in *Sugar*, xli, 8, p. 59, 1946.]

Red rot [*Physalospora tucumanensis*] is now regarded as the most formidable threat to the health of Louisiana sugar-cane. The great difficulty of combating the disease lies in the insufficient resistance of the commercially desirable varieties, while a further complication is introduced by the number of physiologic forms of variable pathogenicity within the species. C.P. 28/11 is very resistant to red rot but does not enjoy wide popularity. A recent release, C.P. 36/105, is resistant, as also is C.P. 36/13, now at the secondary increase stations.

FERNANDEZ (J. A.). **Observaciones sobre royas.** [Observations on rusts.]—Reprinted from *Rev. Fac. Agron. Univ. Montevideo, 1944*, 36, 16 pp., 12 figs., 1944. [Received November, 1946.]

*Uromyces lupini* on white lupin (referred by Viennot-Bourgin in France to *U. renovatus*) [*R.A.M.*, xviii, p. 549] and *Puccinia purpurea* on sorghum are recorded for the first time in Uruguay. Notes are also given on *Puccinia poae* on *Poa annua* [ibid., xii, p. 484] and *P. maydis* on maize, the presence of which in the country was already known.

SINGER (R.). **Type studies on Agarics. II.**—*Lloydia*, ix, 2, pp. 114–131, 1946.

Descriptions are given of type and authentic specimens, preserved in herbaria in the United States, of certain members of the Tricholomataceae, Amanitaceae, Cortinariaceae, and Strophariaceae. Mention may be made of *Marasmius semiustus* [cf. *R.A.M.*, xi, p. 97]. This fungus often causes root disease of sugar-cane in the

Americas, though in Asia the disease appears to be due to a similar species, known as *M. plicatus* [ibid., iv, p. 23] or *M. sacchari* [ibid., xviii, pp. 624, 625], and American workers often erroneously determine the American root disease under these names. *M. semiustus* is 'omnivorous', and probably causes damage on crops other than sugar-cane. Its taxonomic position is ambiguous; it comes between *Marasmius* sect. Rameales Kühner and *Hemimycena* sect. Pseudoconidiophorae Sing. In the author's opinion, it would be best to remove the whole section Rameales from *Marasmius* and incorporate it in *Hemimycena*. Though Murrill identifies *M. semiustus* with *M. stenophyllus* [ibid., xx, p. 579] the description of the latter excludes such a synonymy.

Groves (J. W.). **North American species of Dermea.**—*Mycologia*, xxxviii, 4, pp. 351–431, 57 figs., 1946.

In this study on all the species of *Dermea* known in North America, the author discusses the nomenclature of the group, the conidial states, host relations and parasitism, the taxonomy of the genus, and doubtful and excluded species. The evidence presented indicates that the species of *Dermea* are, in general, specific to their hosts. Little is known about the parasitism of most of the species, but they are, probably, at least weakly parasitic. Under favourable conditions some might be able to cause damage to the host, but in general they do not appear to be of much economic importance.

Savile (D. B. O.). **A new species of Stagonospora on Ambrosia.**—*Mycologia*, xxxviii, 4, pp. 453–454, 1 fig., 1946.

A brief description is given of *Stagonospora ambrosiae* n.sp., found on lesions of *Entyloma compositarum* on *Ambrosia trifida* (North Dakota) in the Mycological Herbarium of the Division of Botany and Plant Pathology, Ottawa.

Whiffen (Alma J.). **Two new terricolous Phycomycetes belonging to the genera Lagenidium and Blastocladiella.**—*J. Elisha Mitchell sci. Soc.*, lxii, 1, pp. 54–58, 1 pl., 1946.

Full descriptions are given of two new terricolous Phycomycetes, including *Lagenidium pythii* n.sp. parasitic on a *Pythium*, from Cuba.

Limber (D. P.), Pollack (Flora G.), & Jenkins (Anna E.). **Elsinoë discovered on Sesbania and Cinnamomum in the United States.**—*Mycologia*, xxxviii, 4, pp. 463–472, 3 figs., 1946.

Descriptions are given of two new species of *Elsinoë*, viz., *E. sesbaniae*, found in South Carolina on *Sesbania exaltata*, sometimes used as a green manure crop, and *E. cinnamomi*, found on *Cinnamomum camphora* in Mississippi. *E. sesbaniae* is characterized by ascomata measuring 46 to 75 by 14 to 40 μ, asci 11·5 to 16 by 11·5 to 15 μ, and ascospores 10 to 12 by 3·5 to 4·5 μ. Acervuli of the *Sphaceloma* stage are often found with the ascomata. They are poorly defined, consist of a dense palisade of pointed conidiophores measuring 4 to 7 by 1·5 to 2 μ, and produce hyaline, oblong-ellipsoid conidia 3·5 to 6 by 1·5 to 3·5 μ. *E. cinnamomi* shows pulvinate ascomata up to 500 μ in diameter by 40 to 80 μ in height, globose to ovoid asci measuring 20 to 36 by 12 to 20 μ which become elongated (48 by 8 μ) in water on rupture of the outer wall, and ascospores measuring 15 to 17 by 4 to 6 μ; in culture the conida are hyaline, oblong-ellipsoid, continuous, and measure 4 to 6 by 2 to 3·5 μ. The pycnospores measure 1·8 to 2·5 by 0·5 μ.

Coker (W. C.). **The United States species of Coltricia.**—*J. Elisha Mitchell sci. Soc.*, lxii, 1, pp. 95–107, 6 pls., 1946.

Descriptive notes (with a key) are given on the seven species included by Murrill (*N. Amer. Flora*, ix, pp. 91–94, 1908) in *Coltricia* [a segregate from *Polyporus*]

characterized, *inter alia*, by lack of setae, and brown spores. Five of these species appear to the author to form a very natural group and are retained in the genus. *Polyporus tomentosus* (in which Murrill includes *P. circinatus*) [*R.A.M.*, xxi, p. 174], parasitic or saprophytic on pine, with its conspicuous setae, duplex flesh, and white spores, seems out of place in *Coltricia* where Murrill placed it.

HAARDICK (H.), KAUSCHE (G. A.), & RUSKA (H.). **Elektronenmikroscopische Bestimmung der Konzentration von Tabakmosaikviruslösungen.** [Electron-microscopic determination of the concentration of Tobacco mosaic virus solutions.]—*Naturwissenschaften*, xxxii, 27–39, pp. 226–228, 3 figs., 1944. [Received October, 1946.]

Particulars are given of a method for the determination of the concentration of tobacco mosaic virus solutions by the electron-microscopic computation of the size of the aerosol mist droplets in the electric field, and of the rod length of the particles contained therein.

HOLMES (F. O.). **A comparison of the experimental host ranges of Tobacco-etch and Tobacco-mosaic viruses.**—*Phytopathology*, xxxvi, 8, pp. 643–659, 2 figs., 1946.

The results of several years' tests to determine the experimental host range of the tobacco etch and tobacco mosaic viruses are presented, with a full tabulation of families and species tested and the effects of inoculations upon them with these two viruses. The conclusion is that species susceptible to strains of etch virus may usually be expected to prove susceptible to strains of the mosaic virus.

Of 310 plants inoculated, 83 were found to be capable of supporting increase of both viruses, 111 to be unable to act as hosts of either, 116 susceptible to mosaic but not to etch, while all those susceptible to etch reacted similarly to mosaic. The earlier conclusion [*R.A.M.*, xvii, 416] that plants susceptible to infection by the tobacco mosaic virus are largely confined to closely related families is confirmed and a similar but somewhat narrower host range is indicated for tobacco etch virus.

These two diseases cause closely similar symptoms in many plants, the etch virus commonly inducing a chlorotic mottling and only rarely etching. Their dissimilarity in respect of other properties is noticed. No other two viruses have such a wide host range, nor so predictable a relationship as regards the plants which they can infect. The similarity in their host requirements and the general likeness of the symptoms which they cause suggest some relationship, but a rather more distant one than that existing between varieties of a single virus.

**Distribution maps of plant diseases.**—Maps 97–120. Issued by the Imperial Mycological Institute, 1946. 3*s*. 9*d*.

The fifth year's issue of this series of maps showing the world distribution of major crop diseases [*R.A.M.*, xxv, p. 96] comprises (No. 97) *Puccinia glumarum* on wheat and other cereals and grasses, (98) *Ganoderma pseudoferreum* on *Hevea* rubber, tea, coffee, etc., (99) *Phytophthora cryptogea* on tomato, etc., (100) sugar-cane streak virus on sugar-cane, (101) *Plasmodiophora brassicae* on crucifers, (102) *Gibberella fujikuroi* on sugar-cane, etc., (103) lily rosette virus on lily, (104) *Fomes noxius* on *Hevea* rubber, etc., (105) *Pyrenophora avenae* on oats, (106) *Physoderma maydis* on maize, (107) elm phloem necrosis virus on elm, (108) *Septoria lycopersici* on tomato, (109) *Phytophthora infestans* on potato and tomato, (110) *Mycosphaerella fragariae* on strawberry, (111) potato yellow dwarf virus on potato, (112) *Cercospora concors* on potato, (113) *Puccinia pittieriana* on potato, tomato and *Solanum* spp., (114) *Entyloma dahliae* on *Dahlia*, (115) potato witches' broom virus on potato, tomato, and tobacco, (116) dahlia mosaic virus on *Dahlia*, (117) *Puccinia chrysanthemi* on chrysanthemum, (118) *Podosphaera leucotricha* on apple, pear, apricot, etc., (119) *Gloeosporium limetticola* on lime, and (120) *Venturia inaequalis* on apple.